

DESCRIPTIONS OF THREE NEW GENERA AND EIGHT NEW SPECIES OF MONACANTHID FISHES FROM AUSTRALIA

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ABSTRACT

Three new genera and eight new species of monacanthid fishes are described from Australian seas. The new genera are *Cantheschenia*, *Bigener* and *Colurodontis*. The first contains *Cantheschenia longipinnis* (Fraser-Brunner) from Lord Howe Island and Western Australia (previously included in *Cantherhines*) and *C. grandisquamis* n.sp. from Queensland. The latter two genera are monotypic, containing *Bigener brownii* (Richardson) from southern Australia and *Colurodontis paxmani* n.sp. from Western Australia and Queensland. The remaining new species with approximate distributions in parentheses are as follows: *Eubalichthys caeruleoguttatus* (Western Australia), *E. fuscusinus* (Western Australia), *E. quadrispinis* (South Australia), *Meuschenia flavolineata* (southern Australia including Tasmania), *M. venusta* (Western Australia and New South Wales), and *Rudarius excelsus* (Queensland). In addition, a key to the genera of Australian monacanthids and a list of the known species from this region are presented.

INTRODUCTION

Australian seas contain 54 species of monacanthid fishes, which far surpasses the number known from any other area (Indonesian-Malaysian Archipelago : approximately 25 species; Japan : 16 species). Many of these have remained poorly known due mainly to the large number of nominal species and the scattered, sporadic nature of the literature. This paper is the result of an investigation to determine the number of valid Australian species and is part of a revisionary study of the family Monacanthidae currently in progress. In the course of this work several new species were discovered and it was necessary to redefine the limits of some genera which left other species unaccommodated. Thus three genera and eight species are herein described as new. A key to the Australian genera is provided as a

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guide to their relationships and a list of species known to inhabit Australian seas is also included.

METHODS

Measurements were made with needle-point dial calipers to the nearest mm (to the nearest 0.1 mm for measurements less than 10 mm). Fig. 1 shows the measurements that were taken for this study, in conjunction with the following : standard length (SL), head length, snout length — the anterior point of these measurements was taken as the front margin of the upper lip (where the lip was damaged or missing, the measurement was made from the middle of the anteriormost pair of teeth); body width — taken across the area of greatest width immediately behind gill opening; interorbital width — measurement was taken from the superiormost point on the eye rim; pelvic bony structure length — does not include barbs projecting anteriorly and posteriorly (often lost); measurements involving the first

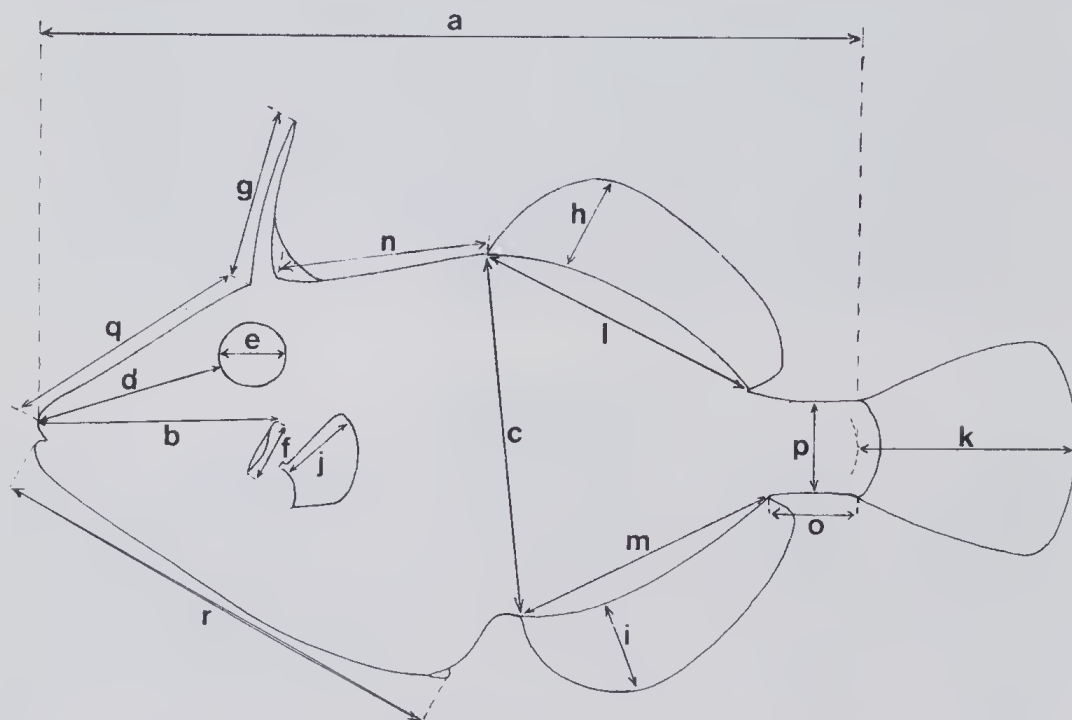


Fig. 1: A guide to the principal measurements used in this paper : a, standard length; b, head length; c, body depth; d, snout length; e, eye diameter; f, gill slit length; g, first dorsal spine length; h, longest soft dorsal ray; i, longest anal ray; j, longest pectoral ray; k, caudal fin length; l, soft dorsal fin base; m, anal fin base; n, interdorsal space; o, caudal peduncle length; p, caudal peduncle depth; q, snout to origin of dorsal spine; r, lower jaw to rear of pelvic bony structure.

dorsal spine were made with the spine in a vertical position; the basal sheath of the soft dorsal and anal fins is not included in fin ray measurements.

The range for proportional measurements which appears in the species accounts is based on specimens in excess of 50 mm SL.

Pectoral fin ray counts were taken from both sides, the left hand side count being listed first in the tables of morphometric data (counts do not include the small rudimentary spine at the origin of the uppermost ray).

The base of the pectoral fin was taken as the uppermost point on the line of flexure which forms when the fin is folded outwards. The centre of the gill slit was taken along the posterior margin of the opercular bones.

Gill raker counts were taken from the outer series on the first gill arch.

Vertebral counts were made with the aid of whole skeletons, radiographs and cleared and stained material.

The peculiar morphology of monacanthids necessitates the following definitions: pelvic bony structure — that structure located in most monacanthids at or near the posterior end of the pelvis, projecting through the skin (Fig. 2) (Randall [1964: 331] calls this the 'pelvic terminus' but as it is not terminal in the genera *Eubalichthys* and *Alutera*, this terminology is not used here); incising scales — the constituents of the pelvic bony structure (see Tyler, 1962), typically two or three pairs (Fig. 3); scale spinules — small to minute spines which arise vertically from the base of the scale, giving the skin its characteristic feel; bristles — elongate scale spinules which develop as a secondary sexual character in the male and may be found either on the caudal peduncle or mid-side of body.

The specimen illustrations have been designed mainly to show colour patterns and obvious structural features. In most cases small structures, such as visible scale outlines, have been omitted or illustrated separately. Apparent minor damage to the skin and fins, usually caused during capture, has also been deleted.

Type specimens have been deposited at the Australian Museum, Sydney (AM); British Museum (Natural History), London (BMNH); CSIRO, Division of Fisheries and Oceanography, Cronulla, New South Wales (CSIRO); Queen Victoria Museum, Launceston, Tasmania (QVM); United States National Museum, Washington, D.C. (USNM); and the Western Australian Museum, Perth (WAM).

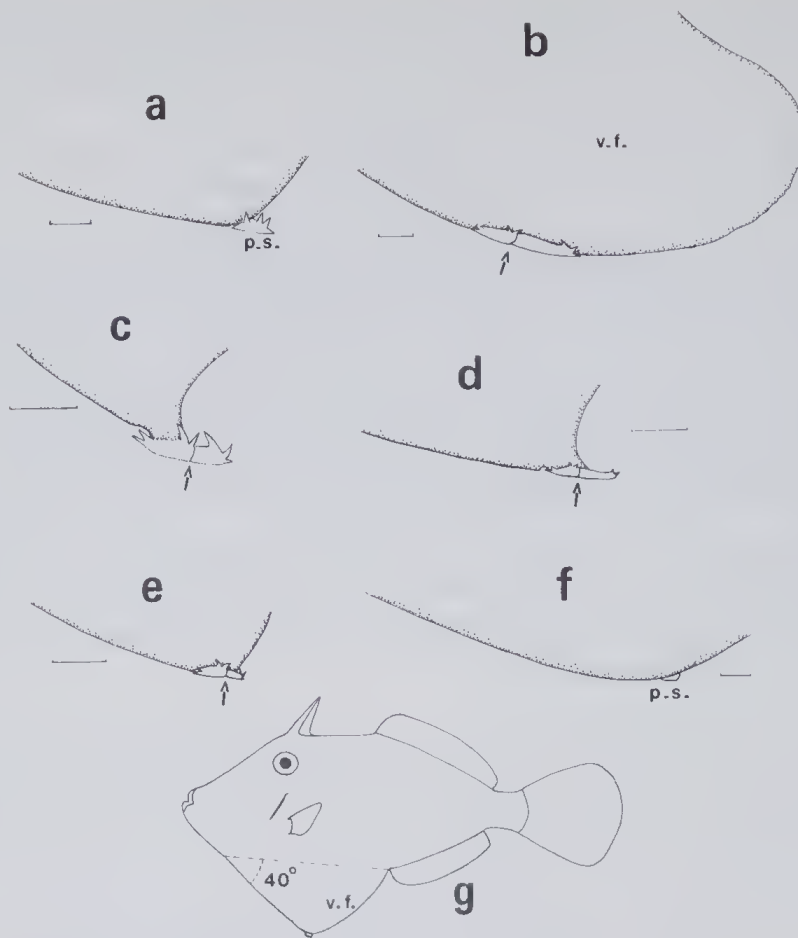


Fig. 2: Semi-diagrammatic illustration showing pelvic bony structures (p.s.) and ventral flaps (v.f.) of certain monacanthids as referred to in the key (dotted line represents the outline of the hidden pelvis, arrow indicates point of articulation, and the horizontal line is equivalent to 5 mm) : a, *Meuschenia*; b, *Monacanthus*; c, *Peripagor*; d, *Paramonacanthus*; e, *Stephanolepis*; f, *Eubalichthys*; g, *Pseudomonacanthus*.

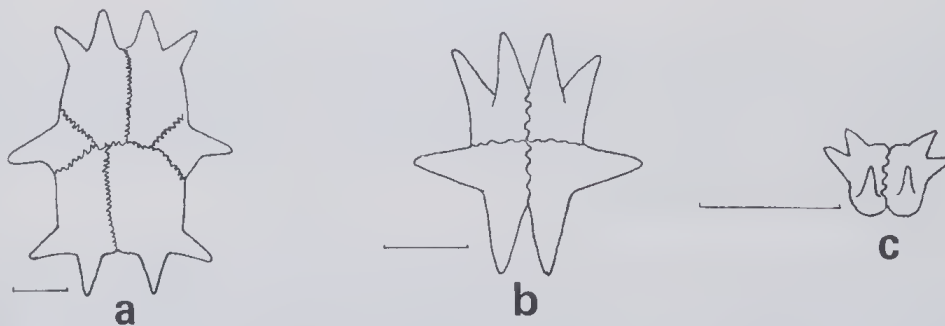


Fig. 3: Semi-diagrammatic illustration of certain pelvic bony structures (ventral view) showing the number of incasing scales as referred to in the key (posterior end faces the top of the page and horizontal line represents 1 mm) : a, 3 pairs (*Cantherhines*); b, 2 pairs (*Penicipelta*); c, 1 pair (*Acanthaluteres*).

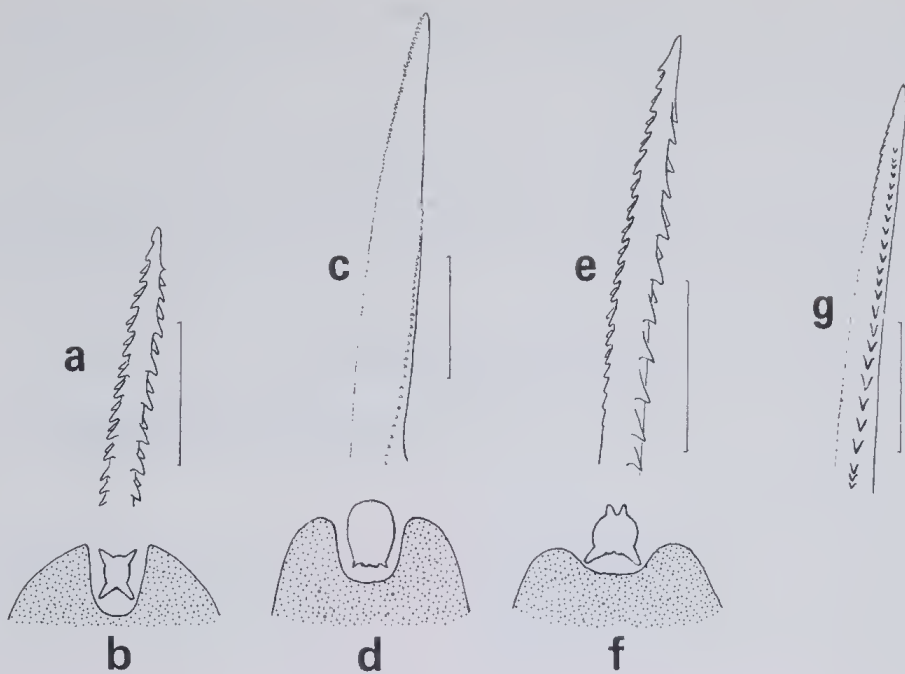


Fig. 4: Semi-diagrammatic illustration showing first dorsal spines (lateral view) and spinal grooves (transverse section) of certain monacanthids as referred to in the key (anterior face towards the left hand side of the page, cross-section made approximately at centre of spine, and vertical line represents 10 mm) : a-b, *Bigener*; c-d, *Cantherhines*; e-f, *Meuschenia*; g, *Thamnaconus*.

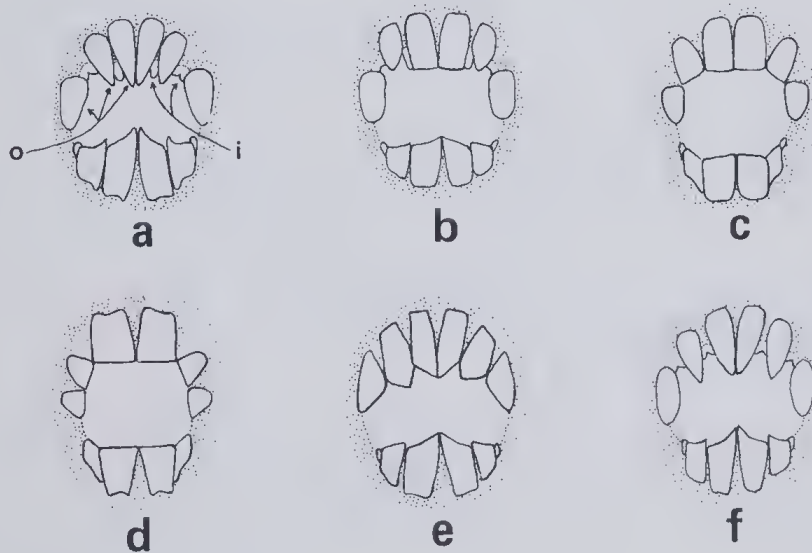


Fig. 5: Semi-diagrammatic illustration showing dentition of certain monacanthids as referred to in the key (i, inner teeth; o, outer teeth) : a, generalised condition; b, *Penicipelta*; c, *Acanthaluteres*; d, *Colurodontis*; e, *Chaetoderma*; f, *Acreichthys*.

KEY TO THE AUSTRALIAN GENERA OF MONACANTHIDAE

- 1a. Fleshy barbel on lower jaw *Anacanthus* Gray, 1831
- 1b. No barbel on lower jaw 2
- 2a. First dorsal spine not fully erectile, enveloped
in a loose flap of skin attached to back ... *Paraluteres* Bleeker, 1866
- 2b. First dorsal spine fully erectile 3
- 3a. Snout produced into a tube, turning upwards
at mouth
... .. *Oxymonacanthus* Bleeker, 1866
- 3b. Snout not tubular 4
- 4a. Soft dorsal and anal fins each with 43 or
more rays 5
- 4b. Soft dorsal and anal fins each with 39 or
less rays 6
- 5a. First dorsal spine originates well in advance
of eye
... .. *Pseudalutarius* Bleeker, 1865
- 5b. First dorsal spine originates over eye
... .. *Alutera* Cloquet, 1816
- 6a. Pelvic bony structure located at posterior
termination of pelvis (Figs 2a-e) 8
- 6b. Pelvic bony structure located anterior to rear
end of pelvis (Fig. 2f) or absent 7
- 7a. Small to medium pelvic bony structure located
about ½ to 1 eye diameter anterior to
posterior end of pelvis; size large (up to 400
mm SL); belly non-inflatable
... .. *Eubalichthys* Whitley, 1930
- 7b. No pelvic bony structure; size small (up to
70 mm SL), body circular in profile; belly
inflatable
... .. *Brachaluteres* Bleeker, 1866
- 8a. Pelvic bony structure not movably articulated
with pelvis (Fig. 2a) 9

- 8b. Pelvic bony structure movably articulated with pelvis (Figs 2b-e) 21
- 9a. First dorsal spine generally wholly received into a deep prominent groove in back when depressed (Figs 4b and 4d); pelvic bony structure consists of 1-3 pairs of incasing scales (Fig. 3) 10
- 9b. Depressed first dorsal spine located in a relatively shallow groove (Fig. 4f) or spinal groove absent; pelvic bony structure usually consists of 2 pairs of incasing scales 14
- 10a. First dorsal spine with round anterior face (Figs 4c-d), usually originating over anterior half of eye, armed with very small barbs or barbs obsolete; 3 pairs of incasing scales 11
- 10b. First dorsal spine 4-edged, with a row of strong downward-directed barbs along each side (Figs 4a-b), originating over anterior to posterior halves of eye; 1-2 pairs of incasing scales 12
- 11a. Soft dorsal fin rays 26-29; anal fin rays 22-25; adults with toothbrush-like patch of bristles or several long spines on middle of side
... .. *Amaneses* Gray, 1835
- 11b. Soft dorsal fin rays 32-39; anal fin rays 28-35; no bristles or spines on middle of side although paired spines or a dense patch of fine bristles may be present mid-laterally on caudal peduncle
... .. *Cantherhines* Swainson, 1839
- 12a. Central pair of teeth in upper jaw with pointed extremities (Fig. 5a); 2 pairs of spines on each side of caudal peduncle (small in adult female and juveniles) *Bigener* n.gen.
- 12b. Central pair of teeth in upper jaw with truncate cutting edges (Figs 5b-c); no caudal peduncle spines 13

- 13a. Obvious pelvic bony structure, consisting of 2 pairs of incasing scales (Fig. 3b); extremities of all outer teeth in upper jaw not truncate, middle one of each side usually pointed (Fig. 5b); adult male with toothbrush-like patch of bristles on middle of side; size medium-large (up to 250 mm SL)
 *Penicipelta* Whitley, 1947
- 13b. Weak pelvic bony structure, consisting of 1 pair of incasing scales which are difficult to distinguish from adjacent scales (Fig. 3c); extremities of all outer teeth in upper jaw truncate (Fig. 5c); no bristles on side; size small (up to 95 mm SL)
 *Acanthaluteres* Bleeker, 1866
- 14a. Size at maturity very small (15-17 mm SL); barbs on anterior face of first dorsal spine directed upwards; elongate bristles on caudal peduncle of adult male; soft dorsal rays 22-28; anal rays 20-24
 *Rudarius* Jordan & Fowler, 1902
- 14b. Size at maturity medium to large (about 50 mm SL and above); barbs on anterior face of first dorsal spine directed downwards or obsolete; caudal peduncle armed with strong spines, dense patch of short bristles or naked; soft dorsal rays 28-39; anal rays 26-37 15
- 15a. Pelvis very mobile, usually capable (before preservation) of moving vertically through an arc of 40° or more, producing a large ventral flap (Fig. 2g); soft dorsal rays 28-36; anal rays 26-34... .. 16
- 15b. Pelvis not so mobile, capable of moving vertically through an arc of usually much less than 40°, producing a small to medium ventral flap; soft dorsal rays 32-39; anal rays 30-37 (very rarely 30) 17
- 16a. Each scale on side with 1 strong spinule, surmounted by a flat fleshy papilla; no

- spines on caudal peduncle; soft dorsal rays
28-31; anal rays 26-29
... .. *Scobinichthys* Whitley, 1931
- 16b. Each scale on side with 1 to many slender
spinules; 1-3 spines in a longitudinal row on
lower portion of caudal peduncle (small in
adult female and juveniles); soft dorsal rays
29-36; anal rays 27-34
... .. *Pseudomonacanthus* Bleeker, 1866
- 17a. Soft dorsal and anal fins usually elevated
anteriorly, at least in adult male; no spines on
caudal peduncle; coloration generally dull 18
- 17b. Soft dorsal and anal fins not elevated anter-
iorly, outer margin convex; caudal peduncle
spines often present (small in adult female
and juveniles, large in adult male); coloration
generally bright with vivid patterns 20
- 18a. Head and body elongate, head length much
greater than body depth; 20 vertebrae
... .. *Nelusetta* Whitley, 1939
- 18b. Head and body not so elongate, head length
equal to or less than body depth 19
- 19a. Soft dorsal and anal fins prominently elevated
anteriorly in both sexes; barbs in postero-
lateral series on first dorsal spine usually
directed laterally (Fig. 4g) or obsolete; 19
vertebrae
... .. *Thamnaconus* Smith, 1949
- 19b. Soft dorsal and anal fins usually elevated only
in adult male; barbs in postero-lateral series
directed rearwards; 20 vertebrae
... .. *Parika* Whitley, 1955
- 20a. Upper profile of snout concave in adults;
first dorsal spine originates over anterior half
of eye, armed with very small barbs; 19
vertebrae
... .. *Cantheschenia* n.gen.

- 20b. Upper profile of snout concave to convex (usually straight to convex in adult male); first dorsal spine originates over anterior to posterior halves of eye, armed usually with medium to large barbs in postero-lateral series. (Fig. 4e), obsolete in large specimens; 20 vertebrae
... .. *Meuschenia* Whitley, 1929
- 21a. Anterior teeth in both jaws with truncate cutting edges (Fig. 5d)
... .. *Colurodontis* n.gen.
- 21b. Anterior teeth in both jaws prominently pointed (Figs 5a, 5e and 5f) 22
- 22a. Dermal filaments greatly developed; inner teeth not visible (Fig. 5e)
... .. *Chaetoderma* Swainson, 1839
- 22b. Dermal filaments not greatly developed, although small to medium ones may be present, especially in juveniles; extremities of inner teeth usually project between outer teeth (Figs 5a and 5f) 23
- 23a. Pelvic bony structure relatively large, armed with prominent barbs (Fig. 2c); first dorsal spine strong, originating over anterior half of eye; bristles present on caudal peduncle of adult male 24
- 23b. Pelvic bony structure elongate or short, armed with small barbs (Figs 2b, 2d and 2e); first dorsal spine slender to medium, originating over anterior to posterior halves of eye; caudal peduncle armed with spines, bristles or naked 25
- 24a. All 4 internal teeth in upper jaw with anterior extremities notched (Fig. 5f); bristles on caudal peduncle of adult male usually in a well defined patch; 20 vertebrae
... .. *Acreichthys* Fraser-Brunner, 1941

- 24b. Upper 2 internal teeth with anterior extremities pointed (Fig. 5a); adult male generally with all scales on side of caudal peduncle developing short bristles, decreasing in size anteriorly; 19 vertebrae
 *Pervagor* Whitley, 1930
- 25a. Ventral flap large, posterior border usually extending well past pelvic bony structure (Fig. 2b); typically 3 pairs of spines on each side of caudal peduncle (small in adult female and juveniles)
 *Monacanthus* Oken, 1817
- 25b. Ventral flap small to medium, rear border usually not extending posterior to pelvic bony structure; no paired spines on caudal peduncle 26
- 26a. Movable segment of pelvic bony structure usually elongate and tapered (Fig. 2d); caudal peduncle unarmed or only a single spine on upper portion; some caudal fin rays of adult male usually produced into filaments
 *Paramonacanthus* Bleeker, 1866
- 26b. Movable segment of pelvic bony structure short (Fig. 2e); patch of small bristles may be present on caudal peduncle of adult male, extending along middle of side; no caudal filaments but second soft dorsal ray usually elongate in adult male 27
- 27a. First dorsal spine with small but prominent downward-directed barbs on anterior face; each scale on sides with 1 to many small spinules arising directly from basal plate
 *Laputa* Whitley, 1930
- 27b. First dorsal spine with small but not noticeably downward-directed barbs on anterior face or barbs obsolete; each scale on sides with 1 to many spinules branching out from a single pedicle
 *Stephanolepis* Gill, 1861

BIGENER new genus

Type species: *Aluterius ? brownii* Richardson, 1844-8: 68.

Diagnosis

A genus of monacanthid fishes with the following combination of characters : central pair of teeth in both jaws with pointed extremities; first dorsal spine square in cross-section, with prominent downward-directed barbs along each corner, the posterior series slightly larger; first dorsal spine received wholly into a deep prominent groove in back when depressed; 2 pairs of spines on each side of caudal peduncle, enlarged, curving forwards and preceded by a dense patch of bristles in adult male, small in adult female and juveniles; 2 pairs of incising scales fused to posterior end of pelvis; vertebrae 7+13.

Description

The following description is based on 16 specimens of *Bigener brownii*, 53-329 mm SL.

Dorsal rays 31 to 34; anal rays 29 to 31; pectoral rays 10 to 11; caudal rays 12; vertebrae 7+13.

Body compressed and somewhat elongate, width 2.0-2.2 in head length, depth 2.5-2.8 in SL; head 3.3-4.1 in SL; upper profile of snout concave (juveniles) to convex, snout length 4.1-4.5 in SL; eye diameter 2.8-4.4 in head length, 1.0-1.4 in interorbital width; gill slit centred below anterior half of eye, occasionally in front of eye, length 3.2-5.2 in head length; pelvis capable of moving vertically through an arc of usually less than 15°, producing a small ventral flap.

Mouth small, terminal, lower jaw projecting, lips not obviously fleshy; dentition consists of 3 outer and 2 inner teeth on each side of upper jaw, extremities of inner teeth projecting between outer ones; 3 teeth on each side of lower jaw, posterior one small to minute; extremities of all external teeth except posteriormost in each jaw pointed; 2 series of slender acute teeth on each side of upper pharyngeal region, first with 7-9 small teeth, second with 3-4 slightly larger ones; gill rakers 38-39 (2 specimens).

First dorsal spine moderately strong, length 1.6-1.8 in head length, originating over anterior half of eye in adults, over centre or posterior half in juveniles, wholly received into a deep prominent groove in back when depressed; dorsal spine square in cross-section, armed with prominent downward-directed barbs on each corner, posterior ones slightly larger; with increasing size barbs on outer portion of dorsal spine become obsolete; second dorsal spine small, hidden in skin at rear base of first spine; soft

dorsal and anal fins not elevated anteriorly, longest soft dorsal ray (about 8th to 12th) 2.7-2.9 in head length; length of soft dorsal fin base 2.6-2.9 in SL, somewhat longer than base of anal fin; interdorsal space large, 0.8-1.2 in head length; base of pectoral fin below anterior half of eye in adults, posterior half in juveniles; posterior margin of caudal fin round, length 1.0-1.3 in head length; all fin rays except those of caudal generally unbranched; pelvic bony structure non-mobile, small (3.9-4.2 in eye diameter), consisting of 2 pairs of incasing scales fused to posterior end of pelvis.

Scales on body small to minute, armed with 1-3 short spinules, curving posteriorly at extremities, giving the skin a smooth to velvety feel; extremities of spinules in adults multifid (usually 3-4 short projections directed posteriorly), supporting a flat fleshy papilla; typically 2 pairs of spines on caudal peduncle, small in juveniles and adult female, strong and curved forwards in adult male; spinules on scales anterior to caudal peduncle spines of adult male prominently elongate, the extremities curving forwards, forming a dense patch of bristles extending to below 20th to 25th soft dorsal ray.

Remarks

The well known species *Bigener brownii* was previously included in *Acanthaluteres*, described by Bleeker (1866: 13) to accommodate *Aleuterius paraguadatus* Richardson (1844-8), which is now regarded as a junior synonym of *Acanthaluteres spilomelanurus* (Quoy & Gaimard, 1824). An additional species, *Penicipelta vittiger* (Castelnau, 1873) has also been previously assigned to this genus, under the name *Acanthaluteres guntheri* (Macleay, 1881), a junior synonym. The main character common to these three species is the shape and armature of the first dorsal spine and deep groove for its reception when depressed. However, *Acanthaluteres* is here considered monotypic on the basis of the unique form of the pelvic bony structure of *A. spilomelanurus*. Whereas *Bigener brownii* and *Penicipelta vittiger* both have 2 pairs of incasing scales fused to the posterior end of the pelvis, *Acanthaluteres spilomelanurus* possesses only one pair (Fig. 3c) (Tyler in his 1962 paper has shown the importance in the reduction of the pelvic bony structure in balistid-monacanthid evolution). In addition, *Bigener* is separable from *Penicipelta* in dentition, the former having the typical monacanthid condition of pointed teeth (Fig. 5a), whereas the latter possesses truncate teeth (Fig. 5b). *Bigener* is apparently an intermediate form between *Penicipelta* and *Meuschenia* (see preceding key for generic characters of *Meuschenia*).

This genus is named *Bigener* (Latin: meaning 'hybrid') with reference to the possession of characters apparently indicative of its relationships with two other genera. It is here used as a singular noun of common gender.

CANTHESCHENIA new genus

Type species: *Amaneses (Cantherhines) longipinnis* Fraser-Brunner, 1941: 198.

Diagnosis

A genus of monacanthid fishes with the following combination of characters : body moderately deep, 1.9-2.4 in SL, upper profile of snout slightly to prominently concave; first dorsal spine slender to moderately strong and armed with very small barbs, originating over anterior half of eye, partly received into a shallow groove in back when depressed; 2 pairs of spines of each side of caudal peduncle, very small in juveniles and adult female, large and curving forward in adult male; 2 pairs of incasing scales fused to posterior end of pelvis; vertebrae 7+12.

Description

The following description is based on 16 specimens of *Cantheschenia longipinnis*, 80-189 mm SL and *C. grandisquamis* n.sp. (see description below).

Dorsal rays 34 to 39; anal rays 32 to 36; pectoral rays 11 to 13; caudal rays 12; vertebrae 7+12.

Body moderately deep, 1.9-2.4 in SL; head rather acute, 3.2-3.7 in SL; upper profile of snout slightly to prominently concave, length 4.0-4.3 in SL; eye diameter 3.2-4.2 in head length; gill slit centred below posterior half of eye, length 2.8-3.6 in head length; pelvis capable of moving vertically through an arc of 20° or less, producing a small to moderate ventral flap.

Mouth small, terminal, lips not obviously fleshy; dentition consists of 3 outer and 2 inner teeth on each side of upper jaw, extremities of inner teeth projecting between outer ones; 2-3 teeth on each side of lower jaw (small posterior tooth lost in *C. longipinnis*); anterior outer teeth in both jaws with pointed extremities; 2 series of slender acute teeth on each side of upper pharyngeal region, 6 small teeth in anterior series, 3 slightly larger ones in posterior row.

First dorsal spine slender to moderately strong, originating over anterior half of eye, partly received into a shallow groove in back when depressed; dorsal spine armed with 4 series of small to minute barbs, 2 adjoining rows on anterior face and 1 series on each postero-lateral edge; soft dorsal and anal fins not elevated anteriorly, about equal in height, outer margin round; base of pectoral fin below posterior half of eye or behind; all fin rays except those of caudal generally unbranched; pelvic bony structure small to moderate, 4.1-5.4 in eye diameter, consisting of 2 pairs of incasing scales fused to rear end of pelvis, armed with small to medium barbs.

Caudal peduncle armed on each side with 2 pairs of spines, very small in juveniles and adult female, strong and curving anteriorly in adult male; spinules on scales anterior to spines of adult male rather elongate and acute, forming a dense patch of bristles extending a short distance anteriorly along middle of side.

Remarks

This genus contains two species, *Cantheschenia longipinnis* and *C. grandisquamis* n.sp. (see description below), the former having been placed by previous authors in *Cantherhines* (Randall, 1964; Allen *et al.*, 1976). However, while possessing some characters of this genus (for example, a concave upper profile of snout, placement of the first dorsal spine over the anterior half of the eye with armature consisting of small to minute barbs, and 19 vertebrae), the reduction in number of the constituents of the pelvic bony structure of *Cantheschenia longipinnis* from three pairs to two pairs of incising scales and absence of a deep spinal groove in back indicates its relationship to *Meuschenia*.

This genus is named *Cantheschenia* (combination of the first two syllables of *Cantherhines* and last three of *Meuschenia*) with reference to its apparent relationships with *Cantherhines* and *Meuschenia*. It is here used as a feminine singular noun.

Cantheschenia grandisquamis new species

(Fig. 6; Table 1)

Holotype

AM I.15684-045, 183 mm SL, male, collected at One Tree Island, Capricorn Group, Great Barrier Reef, Queensland (23°30'S, 152°05'E), by explosives at 29 metres, F. Talbot *et al.*, 1 December 1969.

Diagnosis

A species of *Cantheschenia* with the following combination of characters : relatively large scales on side of body with prominent outlines forming a reticulate pattern (Fig. 6b), each scale with many small spinules arranged in series radiating from a slightly larger central spinule; soft dorsal rays 39, anal rays 36, pectoral rays 13; colour pattern consisting of a dark brown to yellowish brown background with a patch of iridescent blue spots on side of throat and breast, a similarly coloured line along basal sheath of both soft dorsal and anal fins, and upper and lower 4 rays of caudal fin dark blue, with a black bar along posterior margin, the remainder of fin yellow-orange.

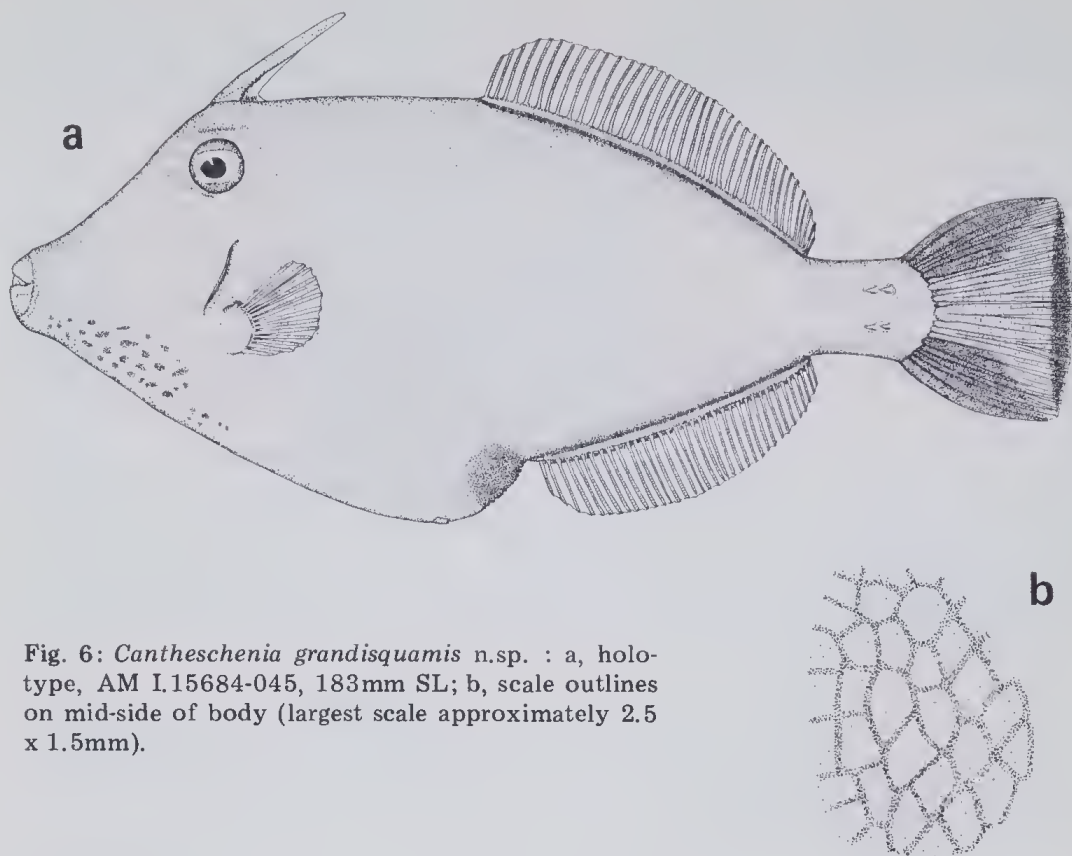


Fig. 6: *Cantheschenia grandisquamis* n.sp. : a, holotype, AM I.15684-045, 183mm SL; b, scale outlines on mid-side of body (largest scale approximately 2.5 x 1.5mm).

Description

Measurements for the holotype, the only known specimen, are presented in Table 1.

Dorsal rays 39; anal rays 36; pectoral rays 13; caudal rays 12; vertebrae 7+12.

Body compressed and moderately deep, width 2.2 in head length and depth 2.4 in SL; head rather acute, length 3.7 in SL; upper profile of snout prominently concave, lower profile concave to a lesser extent, snout length 4.3 in SL; eye diameter 4.2 in head length, 1.2 in interorbital width; gill slit centred below centre of eye, length 2.8 in head length; pelvis capable of moving vertically through an arc of about 20°, producing a small to moderate ventral flap.

Mouth small, terminal, lips somewhat fleshy; dentition normal, consisting of 3 outer and 2 inner teeth on each side of upper jaw, extremities of inner teeth projecting between outer ones; 3 teeth on each side of lower jaw, posterior one small; all external teeth except posteriormost in each jaw pointed; pharyngeal teeth appear to be normal (based on radiographs), with 2 series of slender acute teeth on each side of upper pharyngeal region.

Table 1: Measurements in mm and fin ray counts of type specimens of *Cantheschenia grandisquamis*, *Eubalichthys quadrispinis* and *Meuschenia venusta*.

	<i>C. grandisquamis</i>	<i>E. quadrispinis</i>	<i>M. venusta</i>	
	Holotype AM I.15684-045	Holotype AM E.987	Holotype WAM P.14881	Paratype CSIRO C.2284
Standard length	183	204	110	125
Head length	50	61	37	40
Body depth	76	117	48	47
Body width	23	23	17	18
Snout length	43	54	29	33
Eye diameter	12	14	11	9.8
Interorbital width	14	19	10	11
Gill slit length	18	16	9.8	11
1st dorsal spine length	37*	29*	20	22
Longest soft dorsal ray	18	22	12*	*
Longest anal ray	18	22	12	14
Longest pectoral ray	18	17	11	12
Caudal fin length	38	91	27*	*
Soft dorsal fin base	77	68	43	47
Anal fin base	62	69	38	41
Interdorsal space	53	62	24	27
Caudal peduncle length	17	23	7.5	11
Caudal peduncle depth	20	32	9.9	12
Pelvic bony structure length	2.9	1.2	2.5	2.5
Snout to origin of dorsal spine	50	68	39	44
Lower jaw to rear of pelvic bony structure	102	118	64	72
Soft dorsal ray count	39	32	34	34
Anal ray count	36	33	32	31
Pectoral ray count	13-13	14-13	12-12	12-12
Sex	Male	Female	Female	Male

* measurement affected or not taken because of damage.

First dorsal spine moderately strong, length 1.4 in head length, originating over a point just posterior to anterior border of eye, partly received into a shallow groove in back when depressed; armature of dorsal spine consists of 4 rows of minute downward-directed barbs, 2 series on anterior face close together, almost obsolete, and 1 series on each postero-lateral edge, those near base somewhat larger, pointing laterally; second dorsal spine small, hidden in skin at rear base of first spine; soft dorsal and anal fins not elevated anteriorly, about equal in height, longest soft dorsal ray (16th) 2.8 in head length; length of soft dorsal fin base 2.4 in SL, considerably longer than base of anal fin (3.0 in SL) (bases of fin membranes not perforate); interdorsal space relatively long, 0.9 in head length; base of pectoral fin below a point just anterior to posterior border of eye; caudal fin rather truncate, length 1.3 in head length; all fin rays except those of caudal unbranched; pelvic bony structure small, 4.1 in eye diameter, consisting of 2 pairs of incising scales armed with moderate barbs, fused to rear end of pelvis.

Scales on head and body moderate in size with distinct outlines, especially on mid-side of body, forehead and breast; mid-body scales each with many short acute spinules in series radiating from a slightly larger central spinule, all of which curve posteriorly at their extremities, giving the skin an extremely coarse feel; 2 pairs of strong forward-curving spines on each side of caudal peduncle; spinules on scales anterior to these spines rather elongate and acute, forming a patch of small bristles with a velvety touch, extending to below 26th or 27th soft dorsal ray; lateral line scales visible after slight drying.

Colour of holotype in alcohol (see Fig. 6a) : head and body dark brown, with mid-side of body a paler brown; patch of blackish brown spots on side of throat extending to below pectoral fin base; blackish brown line on basal sheath of both soft dorsal and anal fins, latter fin with similarly coloured spots on base of membranes forming an interrupted line; caudal peduncle spines translucent, covered with a dusky membrane, bases yellowish; area of prominent scales on forehead and breast pale yellowish brown; blackish brown blotch surrounding anus; first dorsal spine dark brown, membrane yellowish with brown markings; soft dorsal, anal and pectoral fins hyaline (except line on anal as above); caudal fin with area of upper and lower 4 rays dark brown, each band contracting prominently on posterior half of fin, a semi-lunar black bar along rear margin, remainder of fin yellowish brown.

Colour in life (based on a colour transparency provided by N. Coleman and a colour plate in Deas, 1971 : 31, both of live fish under water) : head, upper and lower profiles of body dark brown; area of prominent scales on

side of body yellowish with a reticulate pattern of dark brown lines (see Fig. 6b); iridescent blue spots on side of throat and breast to below pectoral fin base; iridescent blue line on basal sheath of soft dorsal and anal fins; caudal peduncle spines and surrounding scales yellowish orange; first dorsal spine dark brown, membrane bright yellow with iridescent blue markings near second spine; soft dorsal, anal and pectoral fin rays brown, membranes hyaline, anal with an interrupted iridescent blue line along basal membranes in 1 specimen; yellowish orange of caudal peduncle extends onto mid portion of caudal fin with upper and lower 4 rays iridescent dark blue, and narrow black transverse bar along posterior margin.

Comparisons

C. grandisquamis is easily distinguished from the only other member of the genus, *C. longipinnis*, by its prominently outlined scales, the latter species having a smooth skin consisting of minute scales. Also, *C. grandisquamis* possesses three teeth on each side of the lower jaw, the posteriormost one very small but not absent as in *C. longipinnis*. Colour patterns are also distinctive as *C. longipinnis* does not have the bright coloration and vivid patterns of *C. grandisquamis*. It is usually a dull brown, sometimes with indistinct dark spots on sides. Other related species which possess well defined scales, such as *Meuschenia trachylepis* and *Amaneses scopas*, have spinules arranged in transverse series on the mid-body scales rather than radially as in *C. grandisquamis*.

Remarks

C. grandisquamis is known only from the holotype collected at One Tree Island and two underwater photographs, one by N. Coleman at Middle Island and the other by W. Deas from Heron Island (pers. comm.). All these localities are in the near vicinity of Gladstone, Queensland, which is approximately adjacent to the southernmost limit of the Great Barrier Reef. More intensive collecting in this area should increase the known range of this species.

As with most other monacanthids that inhabit coral reef areas (for example, *Amaneses scopas*, *Cantherhines pardalis*, *Pervagor melanocephalus* and *Oxymonacanthus longirostris*) *C. grandisquamis* possesses a tough skin with strongly armed scales, especially on the forehead and breast.

This species is named *grandisquamis* (Latin: meaning 'large-scale') with reference to the relatively large prominently outlined scales on the mid-side of the body.

COLURODONTIS new genus

Type species : *Colurodontis paxmani* n.sp. (see below).

Diagnosis

A genus of monacanthid fishes with the following combination of characters : all external teeth with truncate cutting edges, anteriormost pair in each jaw extending across full width of mouth (Fig. 7c); 2 vertical small tusk-like processes on internal surface of anteriormost pair of teeth in lower jaw; first dorsal spine originates over posterior half of eye, armed with 2 series of prominent downward-directed barbs on anterior face, much smaller and more numerous than those in postero-lateral rows; scales on body with 1 central spinule supported by a transverse ridge, those spinules on caudal peduncle of adult male moderately elongate, curving anteriorly; pelvic bony structure movably articulated with pelvis.

Description

See following description of *C. paxmani*, the only species presently known in this genus.

Remarks

Colurodontis appears to be closely related to both *Acreichthys* and *Pervagor* but is easily distinguished from them and other monacanthid genera which possess a movable pelvic bony structure by the truncate central pair of teeth in each jaw. *Acanthaluteres*, which has a similar dentition, is not allied to *Colurodontis* as it possesses a weak, non-mobile pelvic bony structure.

This genus is named *Colurodontis* (Greek: meaning 'truncate-tooth') with reference to the unusual dentition, and is used here as singular noun of feminine gender.

Colurodontis paxmani new species

(Fig. 7; Table 2)

Holotype

WAM P.15454, 120 mm SL, male, collected from Shark Bay (approximately 25° 30'S, 113° 30'E), Western Australia, W. & W. Poole on *Bluefin*, July, 1966.

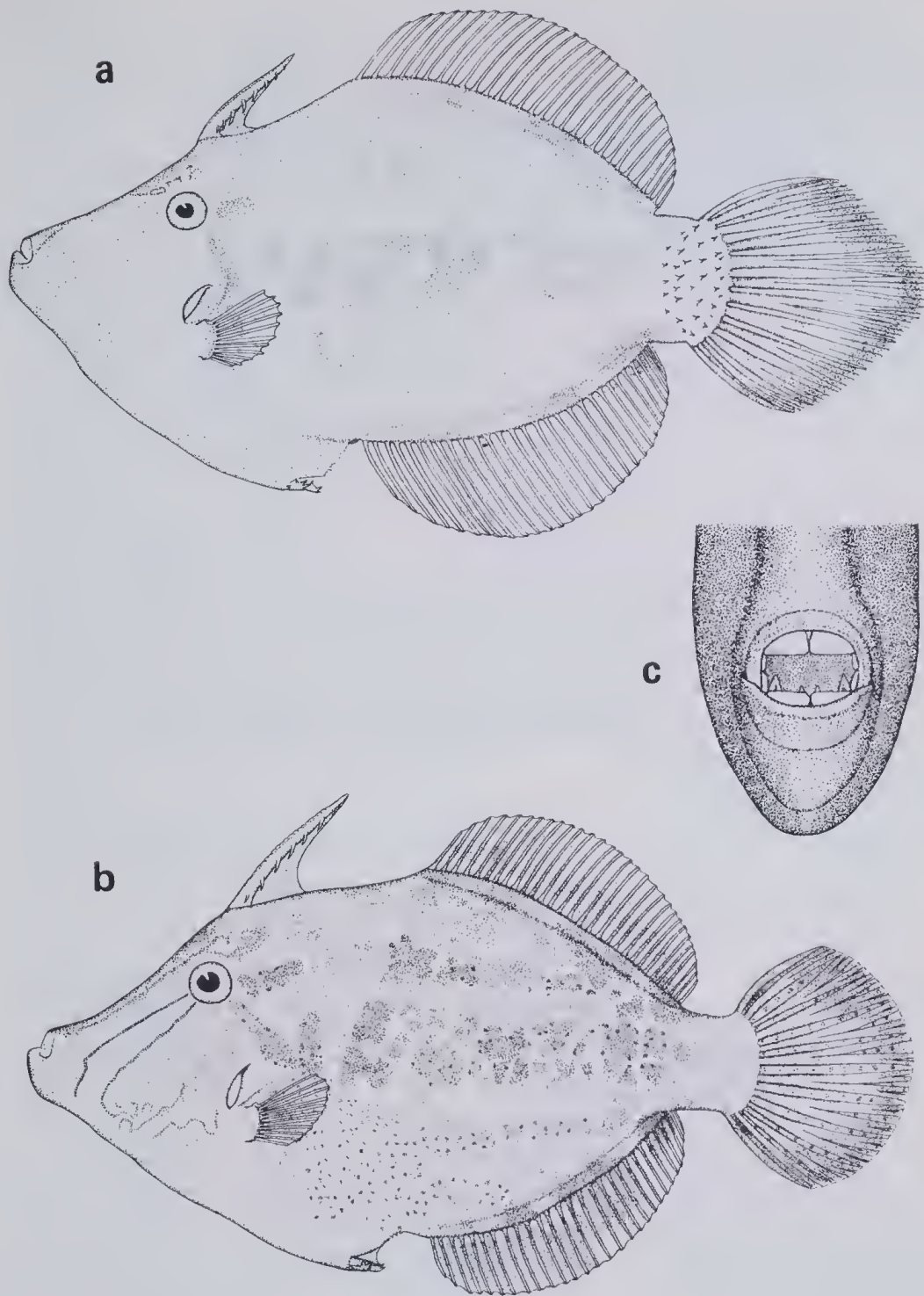


Fig. 7: *Colurodontis paxmani* n.sp. : a, holotype, WAM P.15454, 120 mm SL, male; b, paratype, WAM P.25573-001, 87 mm SL, female; c, anterior view of jaws of above paratype.

Table 2: Measurements in mm and fin ray counts of selected type specimens of *Colurodonitis paxmani*.

	Holotype		Paratypes			
	WAM P.15454	WAM P.15455	WAM P.25570-001	BMNH 1976.8.23.4	WAM P.25571-001	WAM P.25572-001
Standard length	120	118	74	62	42	31
Head length	35	35	25	20	15	11
Body depth	66	69	43	33	23	16
Body width	18	15	12	8.3	7.0	4.9
Snout length	26	25	17	15	9.1	6.7
Eye diameter	8.5	8.9	8.0	6.6	5.3	4.0
Interorbital width	10	10	7.2	6.1	5.0	3.6
Gill slit length	8.7	9.5	5.8	3.1	2.4	1.6
1st dorsal spine length	26	30	21	16	12	6.3
Longest soft dorsal ray	20	19	9.0	7.3	6.8	3.9
Longest anal ray	20	19	8.6	7.1	6.8	3.9
Longest pectoral ray	15	16	10	7.3	6.7	4.0
Caudal fin length	43	40	26	22	15	10
Soft dorsal fin base	60	59	31	26	18	12
Anal fin base	54	54	29	24	17	12
Interdorsal space	28	32	19	15	10	7.0
Caudal peduncle length	6.8	7.5	4.8	4.5	2.8	3.4
Caudal peduncle depth	22	21	12	9.4	6.5	4.0
Pelvic bony structure length	5.8	6.6	4.2	3.5	3.1	1.2
Snout to origin of dorsal spine	35	33	23	21	13	10
Lower jaw to rear of pelvic bony structure	70	70	52	40	29	19
Soft dorsal ray count	30	30	30	28	32	28
Anal ray count	30	29	29	27	31	27
Pectoral ray count	11-11	11-11	11-11	11-11	12-12	11-11
Sex	Male	Male	Female	Female	Male	Juvenile

Paratypes

39 specimens, 11-120 mm SL (unless otherwise designated, all specimens at WAM). Western Australia: P.14871, 78 mm SL, Shark Bay, R.J. McKay, June 1958; P.15455, 118 mm SL, same data as for holotype; P.23242-52, 11 specimens, 12-16 mm SL, between Montebello Islands and Onslow, in *Sargassum* weed, J.B. Hutchins, 11 May 1973; P.24124-5, 2 specimens, 11-12 mm SL, Kendrew Island, Dampier Archipelago, under buoy, J.B. Hutchins, 26 October 1973; P.24126-7, 2 specimens, 13-14 mm SL, Kendrew Island, Dampier Archipelago, in *Sargassum* weed, J.B. Hutchins, 26 October 1973; P.25568-001, 2 specimens, 68-79 mm SL, Shark Bay, R.J. McKay, 5 June 1962; P.25569-001, 8 specimens, 14-17 mm SL, Exmouth Gulf, surface trawl at night, R.J. McKay, 20 June 1964; P.25570-001, 74 mm SL, skeleton, Shark Bay, R.V. Peron, May 1966; P.25571-001, 41 mm SL, Shark Bay, R.J. McKay; P.25572-001, 31 mm SL, Onslow, seine net over reef near caravan park, 25 June 1975; P.25573-001, 87 mm SL, Woodmans Point, near Perth, push-net in weed, M. Thompson, March 1976; AM IB.316, 113 mm SL, Shark Bay, G.P. Whitley, June 1939; BMNH 1976.8.23.4, 62 mm SL, Shark Bay, R.J. McKay, 5 June 1962; USNM 216435, 78 mm SL, Shark Bay, R.J. McKay, 5 June 1962. Queensland: QM I.1935, 5 specimens, 11-18 mm SL, Raine Island (11° 35'S, 144° 05'E), Wanetta Pearling Company, 27 May 1914.

Diagnosis

See relevant section pertaining to the genus.

Description

Measurements and counts of the holotype and selected paratypes are presented in Table 2.

Dorsal rays 27 to 32; anal rays 26 to 31; pectoral rays 10 to 12 (generally 11); caudal rays 12; vertebrae 7+12.

Body prominently compressed and moderately deep, width 1.9-2.4 in head length and depth 1.7-1.9 in SL; head 3.0-3.4 in SL; upper profile of snout slightly to prominently concave, length 4.1-4.7 in SL; eye small, diameter 3.0-4.1 in head length, 0.9-1.2 in interorbital width; gill slit small, 3.7-6.1 in head length, anterior margin prominently curved, centred below posterior half of eye or behind; pelvis capable of only limited vertical movement, producing a small ventral flap.

Mouth small, somewhat superior, lower jaw protruding, lips rather fleshy; dentition consists of 3 external and 2 internal teeth on each side of

upper jaw, 2 teeth on each side of lower jaw, all external teeth with truncate cutting edges (Fig. 7c); anteriormost pair of teeth in each jaw extend across full width of mouth, meeting adjacent teeth at right angles; each anterior tooth of lower jaw possesses a small vertical tusk-like process on internal surface just below cutting edge, the 2 processes tending to form a small groove at teeth junction (Fig. 7c); internal teeth of upper jaw plate-like, with no external cutting edges; 2 series of slender blunt teeth on each side of upper pharyngeal region, first with 5 teeth, second with 3, all of a blackish colour; gill rakers 16-19 (2 specimens).

First dorsal spine moderately strong, length 1.2-1.3 in head length, originating over posterior half of eye, no spinal groove in back; dorsal spine armed with 4 series of prominent downward-directed barbs, anterior face with 2 adjoining rows of relatively small barbs, those in postero-lateral rows very large, about half as numerous as anterior barbs (anterior series may be hidden in skin); second dorsal spine small, hidden in skin at rear base of first spine; soft dorsal and anal fins almost evenly rounded, about equal in height, longest dorsal ray (about 7th to 9th) 1.8-2.8 in head length; length of soft dorsal base 2.0-2.4 in SL, somewhat longer than base of anal fin (bases of fin membranes not perforate); interdorsal space relatively short, about equal to first dorsal spine, profile rising rather steeply to soft dorsal fin in adults; base of pectoral fin below posterior half of eye or behind; caudal fin with rounded posterior margin, middle rays relatively elongate in adult male, length 0.8-1.0 in head length; all fin rays except those of caudal generally unbranched; caudal peduncle deep, length 2.1-3.2 in depth; pelvic bony structure moderate in size with prominent barbs, length 1.3-1.9 in eye diameter, consisting of 3 pairs of incasing scales, anterior 2 pairs fused to rear end of pelvis, posterior pair movably articulated with anterior scales; posterior pair of incasing scales partly fused together posteriorly.

Scales on body small, each with 1 short conical spinule directed posteriorly, giving skin a slightly rough feel; with increasing size, a transverse ridge develops through base of spinule; adult male with a patch of elongate recurved spinules on side of caudal peduncle, extending a short way along mid-side of body, spinules decreasing in size anteriorly, longest about 3-4 in eye diameter; scale outlines prominent on caudal peduncle of adult male.

Colour of holotype in alcohol (Fig. 7a) : head and body pale brown with darker blotches on side forming a wide longitudinal stripe from area behind gill slit to centre of caudal peduncle, width of stripe 1.5-1.8 times eye diameter; 2 dark bars radiate from posterior border of eye, upper extending

about 1 eye diameter towards soft dorsal base, lower almost reaching uppermost pectoral ray; 3 faint blotches on bases of soft dorsal and anal fins, posteriormost one on anal base prominent; upper portion of head with irregular line extending from below first dorsal spine origin, through nostrils, along snout profile to corner of mouth; all fins pale brown to dusky, caudal more blackish posteriorly with narrow irregular pale terminal bar. Paratypes as above with the following exceptions : dark blotches on side of body tend to form 2 additional longitudinal stripes, one from eye to rear base of soft dorsal fin, the other from pectoral to rear base of anal fin; 2 narrow dark lines extend from anterior border of eye towards mouth, bending downwards to throat, the posterior line forming a wavy pattern on side of throat; pelagic juveniles pale with irregular darker blotches.

Colour in life (from colour transparencies and aquarium observations of female specimen WAM P.25573-001 — see Fig. 7b) : ground colour of body pale grey to pale blue with many close-packed green and dark brown blotches, the latter tending to form 3 longitudinal stripes on sides; head greenish brown with 2 thin iridescent blue lines on snout, extending from eye towards mouth, bending downwards to throat, posterior line forming a wavy pattern on side of throat which may extend onto side of breast; small iridescent blue spots may be present near upper profile of head and body; pale orange brown blotch on mid-side of caudal peduncle; first dorsal spine turquoise with dusky membrane; soft dorsal and anal fins hyaline to dusky with 3 irregular dark brown blotches on basal sheath, extending onto fins; caudal fin rays turquoise, membranes orange with a longitudinal row of brown spots between each ray, rays and membranes becoming blackish posteriorly (membrane between upper 2 and lower 2 rays entirely blackish); spinules on scales turquoise. The following are significant variations in live colour pattern : replacement of longitudinal body stripes with irregularly arranged greenish brown blotches; a pale blue stripe on dorsal profile, extending from snout tip to caudal peduncle; dark brown spots may be scattered on body, especially lower half, or absent.

Comparisons

C. paxmani is easily distinguishable by its unusual dentition from all other monacanthid species that possess a movable pelvic bony structure (see also remarks under preceding section on genus).

Distribution

C. paxmani is known from Cockburn Sound, Fremantle, northwards to the Dampier Archipelago, Western Australia, and also from Raine Island, north Queensland.

Remarks

Pelagic juveniles of *C. paxmani* (11-17 mm SL) have been collected in Western Australian waters from floating *Sargassum* weed in association with juvenile *Paramonacanthus oblongus*, a wide ranging species of the Indo-West Pacific area. However, except for five pelagic juveniles from Queensland, *C. paxmani* is known only from Western Australia. Future collecting activity will probably expand the known range of this species.

Post-pelagic juveniles and adults are apparently inhabitants of sea-grass beds (*Posidonia* spp.).

C. paxmani is named in grateful appreciation to Mr B. Paxman who was instrumental in obtaining many monacanthid specimens for the collections of the Western Australian Museum.

Eubalichthys caeruleoguttatus new species

(Fig. 8; Table 3)

Holotype

WAM P.5204, 212 mm SL, male, collected near Beagle Island (29°48'S, 114°52'E), Western Australia, W. & W. Poole on *Bluefin*, March 1962.

Paratypes

22 specimens from Western Australia, 35-253 mm SL (unless otherwise designated, all specimens at WAM). P.9156, 129 mm SL, Shark Bay, prawn trawl at 36 metres, E. Barker, 21 September 1964; P.9157, 134 mm SL, Shark Bay, R.J. McKay, 1960; P.9159, 115 mm SL, Exmouth Gulf, R.J. McKay, 1960; P.11828-9, 2 specimens, 117-142 mm SL, Shark Bay, prawn trawl at 22 metres, E. Barker, 11 October 1964; P.14845, 190 mm SL, skeleton, Shark Bay, A. McKenzie, August 1965; P.14875, 115 mm SL, Exmouth Gulf, R.J. McKay, October 1958; P.14887, 100 mm SL, Exmouth Gulf, R.J. McKay, 17 July 1958; P.22100, 253 mm SL, 56 kilometres NW of Cape Cuvier, J. Penn, 29 July 1972; P.22310, 241 mm SL, same data as for P.22100; P.25555-001, 35 mm SL, Pelsart Group, Houtman Abrolhos, March-August 1960; P.25556-001, 53 mm SL, Shark Bay, A. McKenzie, August 1965; P.25557-001, 24 kilometres W of Carnarvon, prawn trawl at 28 metres, L. Marsh and M. Sinclair, 3-4 June 1975; P.25558-001, 6 specimens, 76-98 mm SL, 15 kilometres SW of Point Quobba, prawn trawl at 38-42 metres, J.B. Hutchins, 13 April 1976; P.25559-001, 44 mm SL, between Koks Island and Point Quobba, W. & W. Poole on *Bluefin*, 23-30 June 1958; P.25579-001, 245 mm SL, 30 kilometres NW of Koks Island, by fish trawl at 76-82 metres, C. Ostle on board Taiwanese trawler, July

1976; AM I.19168-001, 76 mm SL, BMNH 1976.8.23.2, 78 mm SL, USNM 216434, 88 mm SL, all with same data as P.25558-001.

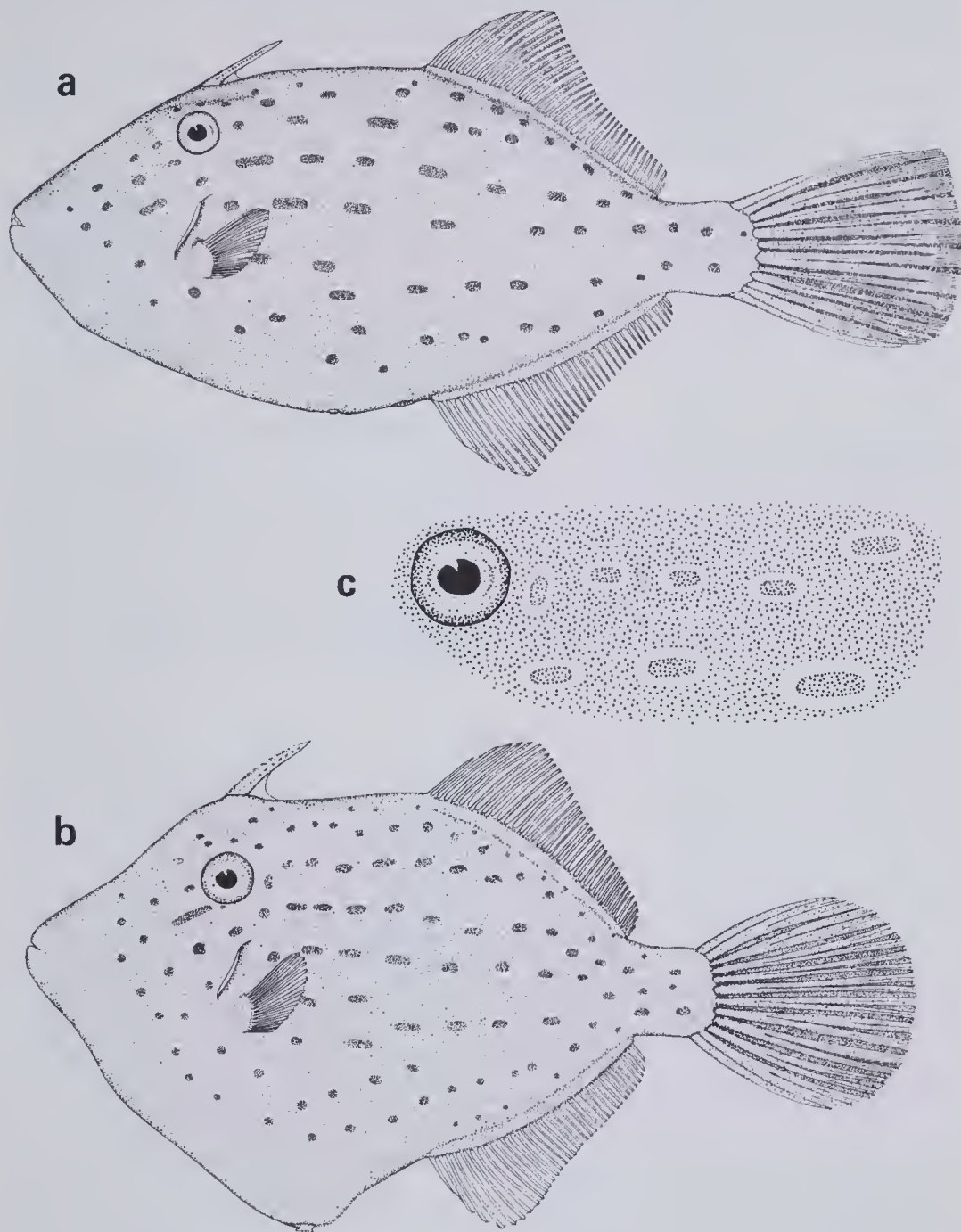


Fig. 8: *Eubalichthys caeruleoguttatus* n.sp. : a, holotype, WAM P.5204, 212 mm SL, male (some upper and lower caudal fin rays damaged); b, paratype, WAM P.14887, 100 mm SL, female; c, variation in colour pattern.

Table 3: Measurements in mm and fin ray counts of selected type specimens of *Eubalichthys caeruleoguttatus*.

	Holotype		Paratypes			
	WAM P.5204	WAM P.22100	WAM P.14845	WAM P.9157	WAM P.25558-001	WAM P.25556-001
Standard length	212	253	190	134	98	53
Head length	64	80	60	44	33	20
Body depth	97	109	90	66	54	31
Body width	27	37	25	18	13	7.6
Snout length	54	65	50	36	26	15
Eye diameter	15	20	14	11	8.7	5.1
Interorbital width	20	24	19	13	10	6.5
Gill slit length	21	24	19	15	11	6.3
1st dorsal spine length	30	*	19*	24	16*	8.5*
Longest soft dorsal ray	38	48	34	22	14	6.2
Longest anal ray	31	43	27*	21	12	6.5
Longest pectoral ray	20	23	16*	14	9.7	5.5
Caudal fin length	68*	70*	64	46	35	15
Soft dorsal base	82	92	75	52	39	21
Anal fin base	77	83	67	48	36	20
Interdorsal space	64	74	55	37	27	15
Caudal peduncle length	18	26	16	12	7.6	4.5
Caudal peduncle depth	28	24	24	17	12	6.7
Pelvic bony structure length	2.6	3.0	2.3	1.8	1.5	1.4
Snout to origin of dorsal spine	62	75	60	43	33	20
Lower jaw to rear of pelvic bony structure	115	133	106	77	57	34
Soft dorsal ray count	38	37	37	37	37	*
Anal ray count	36	35	35	35	36	34
Pectoral ray count	14-14	14-12	14-14	14-13	14-14	14-14
Sex	Male	Female	Male	?	Female	Juvenile

* measurement or count affected by damage, distortion or deformation.

Diagnosis

A species of *Eubalichthys* characterised by the following combination of characters : body moderately deep (1.7-2.4 in SL); first dorsal spine relatively short (1.8-2.4 in head length); caudal fin elongate (0.9-1.3 in head length); colour pattern consisting of brownish grey background with round to elongate blue spots on head and body arranged in longitudinal series.

Description

Measurements and counts of the holotype and selected paratypes are presented in Table 3.

Dorsal rays 35 to 38; anal rays 34 to 36; pectoral rays 13 to 14 (fin of 1 specimen with 12 rays appears to be deformed); caudal rays 12; vertebrae 7+12.

Body compressed and moderately deep, width 2.2-2.6 in head length and depth 1.7-2.4 in SL; head 2.7-3.3 in SL; upper profile of snout slightly concave to convex (latter condition occurring in large adults), length 3.5-3.9 in SL; eye diameter 3.8-4.3 in head length, 1.1-1.4 in interorbital width; gill slit relatively long, 2.9-3.3 in head length, usually centred below anterior half of eye for specimens greater than 150 mm SL, below posterior half or behind eye for smaller specimens; pelvis usually capable of moving vertically through an arc of 25° or less, producing a small to medium ventral flap.

Mouth small, terminal, lips not fleshy; dentition normal, consisting of 3 outer and 2 inner teeth on each side of upper jaw, extremities of inner teeth projecting between the outer ones; 3 teeth on each side of lower jaw, posteriormost small to minute; extremities of all external teeth except posteriormost in each jaw pointed; 2 series of slender acute teeth on each side of upper pharyngeal region, first with 7 small teeth, second with 3 slightly larger ones; gill rakers 30-34 (2 specimens).

First dorsal spine short, 1.8-2.4 in head length, slender to moderately strong, compressed antero-posteriorly in large adults; dorsal spine originates over anterior half of eye, received into a shallow groove in back when depressed or spinal groove absent; dorsal spine armed with 4 series of small to medium downward-directed barbs, anterior face with 2 adjoining rows, each lateral edge with 1 row directed sideways; with increasing SL anterior barbs become relatively smaller, approaching obsolescence; second dorsal spine small, hidden in skin at rear base of first spine; soft dorsal and anal fins elevated anteriorly, longest dorsal ray (about 5th-7th) 1.7-3.2 in head length, slightly longer than longest anal ray; length of soft dorsal base 2.5-2.8 in SL, somewhat longer than base of anal fin (bases of fin membranes

not perforate); interdorsal space 1.0-1.3 in head length; base of pectoral fin usually below posterior half of eye, behind eye in juveniles; caudal fin relatively long in adults, with several upper and lower rays slightly produced in male, length 0.9-1.3 in head length; all fin rays except those of caudal generally unbranched; pelvic bony structure non-mobile, small (3.6-6.7 in eye diameter), consisting of 2 pairs of incising scales armed with small barbs (barbs lost with age), located about $\frac{1}{2}$ to 1 eye diameter anterior to posterior end of pelvis.

Scales on body very small, each with 1-3 transverse rows of minute slender spinules (up to 6 in each row), giving the skin a smooth to velvety feel; scale outlines visible only under magnification; caudal peduncle unarmed.

Colour of holotype in alcohol (Fig. 8a): head and body brown with longitudinal series of round to elongate purplish brown spots, about 7 series on side of body, upper and lower rows tending to follow respective body profiles and meeting on side of head, 2 series extending onto caudal peduncle; soft dorsal, anal and pectoral fins yellowish brown, membranes of outer portions dusky; caudal fin rays pale greenish grey, membranes dusky, becoming darker on posterior half of fin. Paratypes as above with the following exceptions: ground colour varies from greenish grey to brownish grey; spots on head and body may be pale blue to grey, surrounded by a wide paler ring (see Fig. 8c) or almost invisible.

Colour in life (from two freshly caught specimens, 79 and 245 mm SL): large specimen — ground colour brownish grey, paler ventrally; longitudinal series of large blue spots on head and body, more iridescent near upper and lower profiles; all fin rays turquoise, membranes of soft dorsal and anal dusky on outer portions, caudal membranes dusky becoming increasingly darker towards posterior margin; small specimen — ground colour brownish grey with somewhat darker irregular blotches on body, and indistinct yellowish blotches on head; longitudinal series of prominent pale blue to iridescent blue spots on sides of body and head; first dorsal spine brownish grey, membrane more blackish; soft dorsal, anal and pectoral fin rays brownish orange, membranes dusky; caudal fin rays pale brownish grey, membranes dark brownish grey becoming blackish near outer margin; iris yellow; lips pale orange.

Comparisons

E. caeruleoguttatus is readily distinguished from other species of the genus by the characteristic longitudinal series of round and elongate blue spots on a brownish grey ground colour. *E. fuscusinus* has prominent dark

brown stripes on head and body following the curved course of the lateral line; *E. mosaicus* possesses yellow oval blotches arranged longitudinally on head and body, sometimes with blue lines forming a mosaic pattern on side; *E. gunnii* is brown with darker blotches and spots forming a mosaic pattern on side; and *E. bucephalus* may be wholly brown or black, or brownish grey with 3-4 longitudinal black stripes, and eye with a prominent white marginal ring (juveniles pale brown with scattered dark brown spots on head and body). The colour pattern of *E. quadrispinis* is not known; however the presence of spines on the caudal peduncle easily separates this species.

Distribution

Known only from Western Australia, from Beagle Island, south of Geraldton, north to Exmouth Gulf. It has been taken in depths of 22 to 82 metres.

Remarks

This species is named *caeruleoguttatus* (Latin: meaning 'blue-spotted') with reference to the blue spots on the head and body.

Eubalichthys fuscusinus new species

(Fig. 9; Table 4)

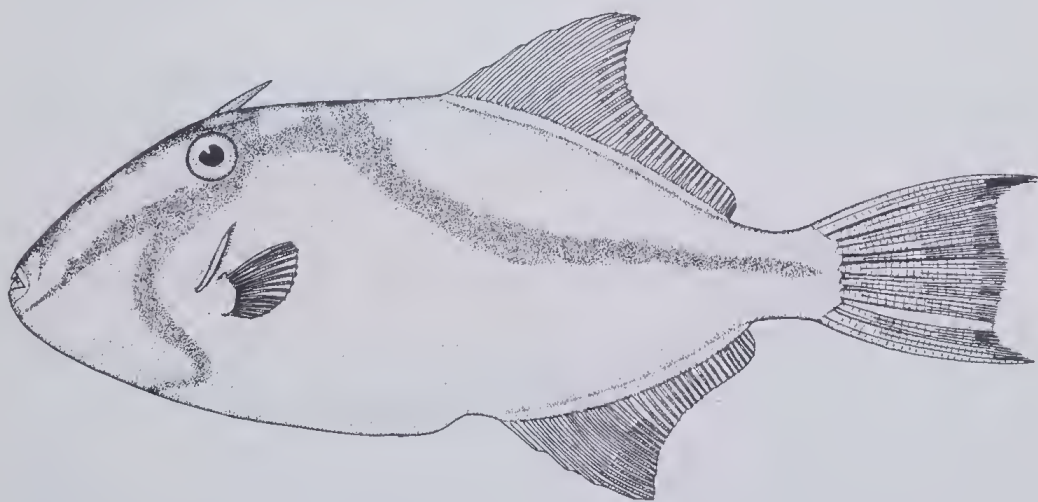


Fig. 9: *Eubalichthys fuscusinus* n.sp., holotype, WAM P.25580-001, 273 mm SL.

Holotype

WAM P.25580-001, 273 mm SL, male, collected 30 kilometres NW of Koks Island (24° 45'S, 113° 09'E), Western Australia, by fish trawl at 76-82 metres, C. Ostle on board Taiwanese trawler, July 1976.

Paratypes

4 specimens, 231-253 mm SL. WAM P.25579-002, 2 specimens, 231-253 mm SL, AM I.19167-001, 241 mm SL, BMNH 1976.8.23.3, 244 mm SL, all with the same data as for holotype.

Diagnosis

A species of *Eubalichthys* with the following combination of characters : body relatively elongate (depth 2.4-2.7 in SL); first dorsal spine short (2.7-3.2 in head length); caudal fin lunate and moderately elongate (0.9-1.1 in head length); colour pattern consisting of brownish grey background with prominent dark brown stripe following the curved paths of the lateral line, singular on body and dividing into 3 stripes on head.

Description

Measurements and counts of the holotype and paratypes are presented in Table 4.

Dorsal rays 36 to 39; anal rays 34 to 37; pectoral rays 13 to 14; caudal caudal rays 12; vertebrae 7+12.

Body compressed and rather elongate, width 2.0-2.3 in head length and depth 2.4-2.7 in SL; head 3.2-3.3 in SL; upper profile of snout convex, length 3.8-4.1 in SL; eye diameter 4.2-4.7 in head length, 1.2-1.4 in inter-orbital width; gill slit 3.1-3.6 in head length, centred below centre of eye or slightly farther forward; pelvis capable of moving vertically through an arc of not more than 10°, producing a small to inconspicuous ventral flap.

Mouth small, terminal, lips not fleshy; dentition normal, consisting of 3 outer and 2 inner teeth on each side of upper jaw, extremities of inner teeth projecting between outer ones; 3 teeth on each side of lower jaw, posterior one small; all external teeth except posteriormost in each jaw with pointed extremities; pharyngeal teeth appear normal (from radiograph) with 2 series of slender acute teeth on upper portion of pharyngeal region; gill rakers 35 (1 specimen).

Table 4: Measurements in mm and fin ray counts of type specimens of *Eubalichthys fuscusinus*.

	Holotype		Paratypes			
	WAM	WAM	BMNH	AM	WAM	WAM
	P.25580-001	P.25579-002	1976.8.23.3	I.19167-001	P.25579-002	P.25579-002
Standard length	273	253	244	241	231	231
Head length	84	78	75	75	69	69
Body depth	111	98	92	92	93	93
Body width	40	39	34	36	30	30
Snout length	71	66	62	64	56	56
Eye diameter	18	18	18	17	16	16
Interorbital width	25	23	22	21	19	19
Gill slit length	27	24	22	21	22	22
1st dorsal spine length	26	28	28	23	21	21
Longest soft dorsal ray	60	53	52	53	47	47
Longest anal ray	53	47	46	49	43	43
Longest pectoral ray	26	24	23	24	22	22
Caudal fin length	90	74	71	80	70	70
Soft dorsal fin base	108	96	89	90	88	88
Anal fin base	94	86	79	80	77	77
Interdorsal space	74	69	71	69	63	63
Caudal peduncle length	21	23	25	22	25	25
Caudal peduncle depth	29	26	24	25	24	24
Pelvic bony structure length	2.8	2.9	2.8	2.8	2.6	2.6
Snout to origin of dorsal spine	83	79	72	74	65	65
Lower jaw to rear of pelvic bony structure	132	125	123	118	116	116
Soft dorsal ray count	39	37	36	36	38	38
Anal ray count	37	36	34	34	35	35
Pectoral ray count	14-14	14-13	13-13	14-14	13-13	13-13
Sex	Male	Male	Male	Male	Male	Male

First dorsal spine short (2.7-3.3 in head length), compressed antero-posteriorly with prominent lateral edges, received wholly into a shallow to moderately deep groove in back when depressed; dorsal spine armed with 4 series of small downward-directed barbs, 2 adjoining rows on anterior face, 1 row along each lateral edge consisting of relatively larger laterally-directed barbs (barbs becoming obsolete with increasing SL); second dorsal spine small, hidden in skin at rear base of first spine; soft dorsal and anal fins prominently elevated anteriorly, longest soft dorsal ray (5th) 1.4-1.5 in head length, somewhat longer than longest anal ray; length of soft dorsal fin base 2.5-2.6 in SL, considerably longer than base of anal fin (bases of fin membranes not perforate); interdorsal space 1.1 in head length; base of pectoral fin below posterior half of eye; caudal fin lunate and relatively long, 0.9-1.1 in head length; all fin rays except those of caudal generally unbranched; pelvic bony structure non-mobile, small (6.2-6.4 in eye diameter), consisting of 2 pairs of incising scales armed with minute barbs, located about $\frac{1}{2}$ eye diameter anterior to posterior end of pelvis.

Scales on body minute, each with 1-5 transverse rows of minute slender spinules, giving the skin a smooth to slightly velvety feel; scale outlines visible only under magnification; caudal peduncle unarmed.

Colour of holotype in alcohol (Fig. 9) : head and body pale brownish grey with a prominent dark brown stripe (about $\frac{1}{2}$ eye diameter in width) following the curved paths of the lateral line, singular on body and dividing into three stripes on head; uppermost head stripe joined across dorsal profile to corresponding stripe of opposite side by 3 short bars, first across snout and posterior 2 on either side of dorsal spine, and lowest stripe confluent with corresponding stripe across throat; some irregular blotches extend from upper portion of body stripe to interdorsal space; all fins with turquoise rays, membranes hyaline to dusky. Paratypes are similarly coloured.

Colour when fresh (frozen specimens) : colour is generally the same as in the preserved condition described above except that the ground may be more brownish with bronze reflections.

Comparisons

E. fuscusinus is easily distinguished from the closely related *E. caeruleoguttatus* by its distinctive coloration (see comparisons section for *E. caeruleoguttatus*). In addition, *E. fuscusinus* is relatively more elongate (body depth 2.4-2.7 in SL) than *E. caeruleoguttatus* (1.7-2.4).

Distribution

E. fuscusinus is known only from the type locality off Carnarvon, Western Australia, in relatively deep water (80 metres).¹

Remarks

This species is named *fuscusinus* (Latin: meaning 'brown-curve') with reference to the brown stripe which follows the curved paths of the lateral line on the head and body.

Eubalichthys quadrispinis new species

(Fig. 10; Table 1)

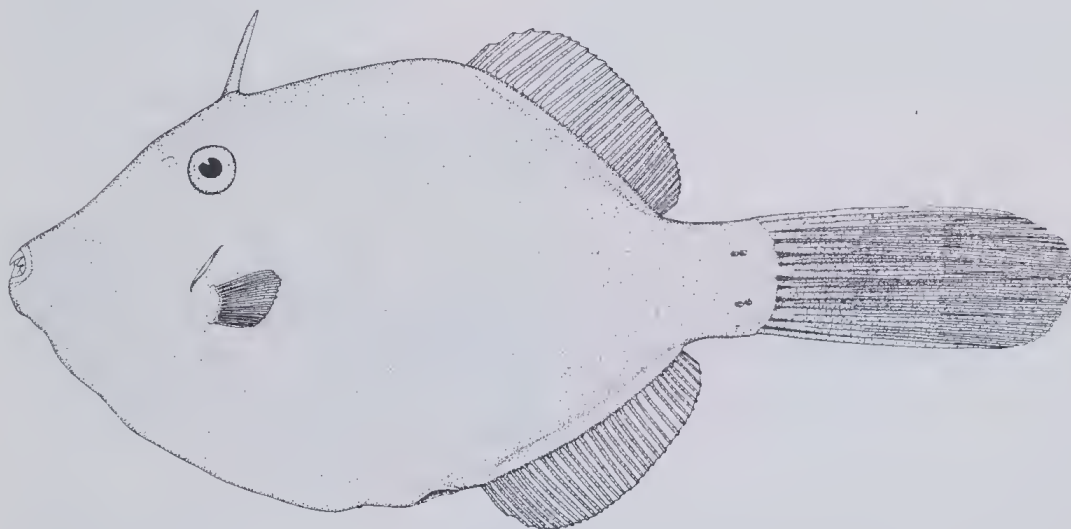


Fig. 10: *Eubalichthys quadrispinis* n.sp., holotype, AM E.987, 204 mm SL.

Holotype

AM E.987, 204 mm SL, female, 80 kilometres off Cape Wiles (34°57'S, 135°41'E), South Australia, 135 metres, FIV *Endeavour*, 28 September 1909.

¹ While this paper was in press, further material sent on loan from the CSIRO, Cronulla produced another specimen of *E. fuscusinus*, CSIRO C.4867, which was collected off the north-west coast of Western Australia by the Japanese research vessel *Umitaka Maru* in 1960. The following measurements and counts pertain to this specimen: standard length — 224 mm; body depth — 95 mm; soft dorsal ray count — 36; anal ray count — 34. This male specimen is here designated as a paratype.

Diagnosis

A species of *Eubalichthys* with the following combination of characters : low fin ray counts (D.32; A.33); base of anal fin longer than soft dorsal base; caudal fin greatly elongate (0.7 in head length); 2 pairs of spines on each side of caudal peduncle; pelvic bony structure very small, located about 1 eye diameter anterior to rear end of pelvis.

Description

Measurements of the holotype are presented in Table 1.

Dorsal rays 32; anal rays 33; pectoral rays 14 and 13; caudal rays 12; vertebrae 7+12.

Body compressed and deep, width 2.7 in head length and depth 1.7 in SL; head 3.3 in SL; upper profile of snout slightly concave, length 3.8 in SL; eye diameter 4.4 in head length, 1.4 in interorbital width; gill slit centred below a point just posterior to anterior border of eye, length 3.8 in head length; pelvis capable of moving vertically through an arc of 10° , producing an inconspicuous ventral flap.

Mouth small, terminal, lips not obviously fleshy; dentition normal, consisting of 3 outer and 2 inner teeth on each side of upper jaw, extremities of inner teeth projecting between outer ones; 3 teeth on each side of lower jaw, posterior one small; all external teeth except posteriormost in each jaw with pointed extremities; pharyngeal teeth appear normal (based on radiograph), with 2 series of acute teeth on each side of upper pharyngeal region.

First dorsal spine moderately strong, length 2.1 in head length, originating over a point just posterior to centre of eye, no spinal groove in back; dorsal spine armed with 4 series of small to minute barbs, 2 rows on anterior face only visible near extremity of spine, 1 row of outward-directed barbs on each lateral edge, more prominent than anterior barbs; second dorsal spine small, hidden in skin at rear base of first spine; soft dorsal and anal fins not elevated anteriorly, longest dorsal ray (8th) 2.8 in head length, about equal to longest anal ray; length of soft dorsal fin base 3.0 in SL, slightly shorter than anal fin base (bases of fin membranes not perforate); interdorsal space 1.0 in head length; base of pectoral fin below a point just anterior to centre of eye; caudal fin greatly elongate, 0.7 in head length, posterior border round; all fin rays except those of caudal unbranched; pelvic bony structure small, 11.7 in eye diameter, armed with small vertical barbs, no scale divisions visible; rear end of pelvis extends about 1 eye diameter posterior to pelvic bony structure.

Scales on body small, each with 2-4 transverse rows of minute slender spinules, giving the skin a smooth feel; two pairs of small forward-curving spines on each side of caudal peduncle.

Colour of holotype in alcohol (Fig. 10) : after long preservation, head, body and fins brown, with first dorsal spine and caudal fin rays more reddish, and caudal fin membrane somewhat dusky.

Comparisons

E. quadrispinis is easily distinguished from other members of the genus in the presence of spines on the caudal peduncle. It appears to have affinities with the Atlantic species *Alutera schoepfii* Walbaum and *A. heudelotii* Hollard; however, these species lack the characteristic spines on the caudal peduncle (see below).

Distribution

Known only from the type locality off South Australia.²

Remarks

E. quadrispinis is provisionally placed in the genus *Eubalichthys*. It appears to have some characters of *Alutera* which include an anal fin base which is longer than that of the soft dorsal fin and a very small pelvic bony structure, apparently consisting of only one incasing scale (other species of *Eubalichthys* have the soft dorsal fin base longer and pelvic bony structure with two pairs of incasing scales). However the moderately strong first dorsal spine and 19 vertebrae distinguish it from the four known species of *Alutera* (feeble dorsal spine and 20-23 vertebrae).

This species is named *quadrispinis* (Latin: meaning 'four-spined') with reference to the two pairs of spines on each side of the caudal peduncle.

² A second specimen of *E. quadrispinis*, CSIRO C.1447 was received from the CSIRO while this paper was in press. It was collected by the Japanese research vessel *Umitaka Maru* off the north-west coast of Western Australia in 1960. The following measurements and counts pertain to this specimen: standard length — 268 mm; body depth — 134 mm; anal ray count — 34 (soft dorsal fin damaged); pectoral ray count — 13.13. This female specimen is here designated as a paratype.

Meuschenia flavolineata new species

(Fig. 11; Table 5)

Holotype

WAM P.25489-001, 233 mm SL, male, collected on Middle Bank, 2 kilometres SE of Rottnest Island (32°05'S, 115°33'E), Western Australia, by spear at 15 metres, J.B. Hutchins, 24 August 1975.

Paratypes

33 specimens, 26-239 mm SL (unless otherwise designated, all specimens at WAM). Western Australia: P.9155, 144 mm SL, Irwin Point, W of Albany, craypot at 40 metres, R.J. McKay, 13 July 1959; P.24514, 157 mm SL, Canal Rocks, spear at 1 metre, J.B. Hutchins, 30 January 1973; P.25150-008, 137 mm SL, Canal Rocks, spear at 2 metres, J.B. Hutchins, 30 December 1974; P.25173-001, 162 mm SL, skeleton, Bickley Point, Rottnest Island, spear at 3 metres, J.B. Hutchins, 16 February 1975; P.25250-004, 176 mm SL, Salmon Bay, Rottnest Island, spear at 10 metres, J.B. Hutchins, 6 April 1975; P.25251-003, 2 specimens, 178-190 mm SL, Bickley Point, Rottnest Island, spear at 10 metres, G.R. Allen and J.B. Hutchins, 9 April 1975; P.25252-002, 201 mm SL, off Carnac Island, 7-8 metres, G.R. Allen, 6 April 1975; P.25549-001, 81 mm SL, Woodmans Point, L. Smith, hand net at 1 metre, April 1976; P.25550-001, 48 mm SL, Ringbolt Bay, Augusta, hand net at 3 metres, J.B. Hutchins, 27 April 1976; P.25551-001, 67 mm SL, Armstrong Point, Rottnest Island, University of Western Australia Zoology Camp, 11 March 1964; P.25553-001, 239 mm SL, same data as for holotype; BMNH 1976.8.23.1, 134 mm SL, Bunbury, fish trap, M. Walker, 5 November 1975; USNM 216433, 164 mm SL, Bickley Point, Rottnest Island, spear at 10 metres, G.R. Allen and J.B. Hutchins, 9 April 1975. Tasmania: QVM 1975.5.197-9, 3 specimens, 198-212 mm SL, Waterhouse area, R.J. Gillham, 4 April 1971. New South Wales: AM I.17019-027, 66 mm SL, Long Reef, Sydney, rotenone and hand net at 0.3 metres, D. Hoese *et al.*, 27 March 1973; AM I.17033-051, 13 specimens, 48-75 mm SL, North Head, Sydney Harbour, rotenone, J. Paxton *et al.*, 6 April 1973; AM I.18301, 2 specimens, 26-40 mm SL, Thompsons Bay, Sydney, R. Kuiter, February 1975.

Diagnosis

A species of *Meuschenia* with the following combination of characters : first dorsal spine originating over centre or anterior half of eye, armed with small barbs; 2 pairs of spines on caudal peduncle; skin moderately coarse; colour of adults blackish brown with a yellow-orange patch on caudal

peduncle, continued along middle of side as a yellow stripe; caudal fin entirely black or yellow coloration of caudal peduncle continued onto anterior half of fin.

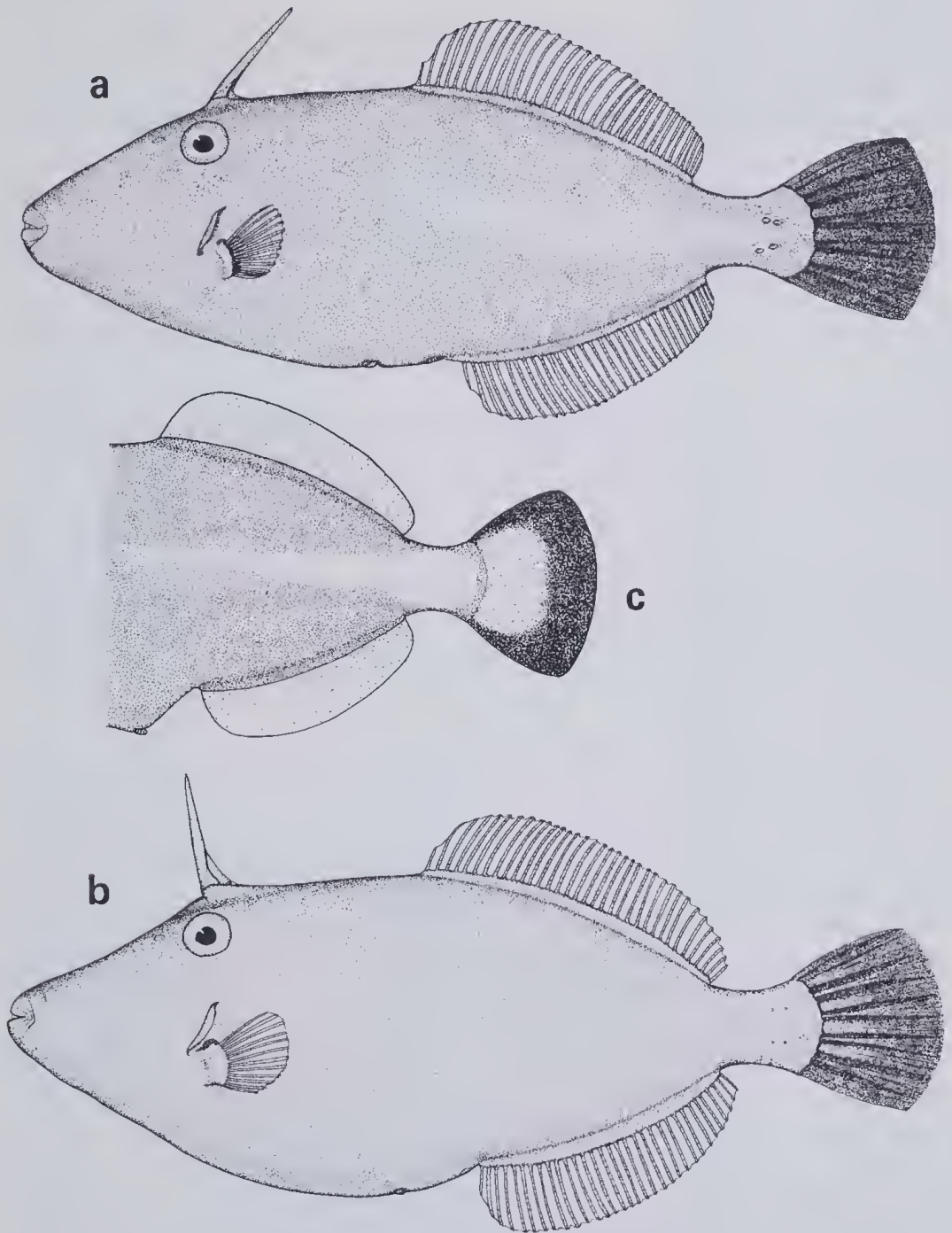


Fig. 11: *Meuschenia flavolineata* n.sp. : a, holotype, WAM P.25489-001, 233 mm SL, male; b, paratype, WAM P.25553-001, 239 mm SL, female; c, variation in life colour pattern.

Description

Measurements and counts of the holotype and selected paratypes are presented in Table 5.

Dorsal rays 33 to 37; anal rays 31 to 35; pectoral rays 11 to 12; caudal rays 12; vertebrae 7+13.

Body compressed and moderately elongate, somewhat deeper in adult female and juveniles, width 2.0-2.4 in head length and depth 2.0-2.8 in SL; head length 3.0-3.7 in SL; upper profile of snout slightly convex (large male condition) to concave, length 3.9-4.2 in SL; eye diameter 3.3-4.6 in head length, 1.0-1.3 in interorbital width; gill slit centred below anterior half of eye, length 3.4-5.4 in head length; pelvis capable of moving vertically through an arc of generally not more than 15°, producing a small ventral flap.

Mouth small, terminal, lower jaw protruding slightly, lips not obviously fleshy; dentition normal, consisting of 3 outer and 2 inner teeth on each side of upper jaw, extremities of inner teeth projecting between outer ones: 3 teeth on each side of lower jaw, posterior one small; all external teeth except posteriormost in each jaw with pointed extremities; 2 series of slender acute teeth on each side of upper pharyngeal region, first with 7-8 small teeth, second with 3 slightly larger ones (in 1 of 2 specimens examined, teeth in first series on left hand side deformed, somewhat larger than normal, 6 in number); gill rakers 32-33 (2 specimens).

First dorsal spine moderately strong, length 1.3-1.7 in head length, usually originating over centre or anterior half of eye (rarely behind centre), received partly into shallow groove in back when depressed; dorsal spine armed with 4 series of small downward-directed barbs, anterior face with 2 adjoining rows, each postero-lateral edge with 1 row of slightly larger barbs, less in number than those in anterior series; with increasing SL, barbs become more numerous and relatively smaller approaching obsolescence; second dorsal spine small, hidden in skin at rear base of first spine; soft dorsal and anal fin rays about equal in height, longest soft dorsal ray (about 8th to 10th) 2.4-3.1 in head length; length of soft dorsal fin base 2.5-2.6 in SL, somewhat longer than base of anal fin (base of fin membranes not perforate); interdorsal space 1.0-1.4 in head length; base of pectoral fin usually below posterior half of eye; posterior margin of caudal fin round, length 1.2-1.8 in head length; all fin rays except those of caudal generally unbranched; pelvic bony structure small to moderate, 2.5-5.0 in eye diameter, consisting of 2 pairs of incising scales fused to posterior end of pelvis, armed with small to medium barbs (obsolescent with age).

Table 5: Measurements in mm and fin ray counts of selected type specimens of *Meuschenia flavolineata*.

	Holotype		QVM	Paratypes		WAM	AM
	WAM	P.25489-001	1975-5-199	WAM	P.25150-008	P.25549-001	I.17033-051
Standard length	233		212	178	137	81	51
Head length	65		60	48	40	26	17
Body depth	85		77	73	61	38	25
Body width	30		25	23	20	11	7.7
Snout length	57		51	41	35	20	13
Eye diameter	14		13	12	11	7.7	5.2
Interorbital width	18		16	15	12	7.8	5.6
Gill slit length	17		14	13	9.6	4.8	3.5
1st dorsal spine length	40		36	32	27	16	11
Longest soft dorsal ray	24		25	16	14	8.7	5.5
Longest anal ray	24		23	15	14	8.5	5.4
Longest pectoral ray	20		20	16	13	8.8	5.5
Caudal fin length	46		38	37	33	21	14
Soft dorsal fin base	92		85	72	53	32	20
Anal fin base	80		72	62	44	29	18
Interdorsal space	58		54	44	35	19	12
Caudal peduncle length	23		23	22	14	7.4	5.5
Caudal peduncle depth	21		19	17	15	8.6	5.2
Pelvic bony structure length	3.7		3.1	3.0	2.2	1.7	2.0
Snout to origin of dorsal spine	67		60	50	43	26	18
Lower jaw to rear of pelvic bony structure	117		114	93	77	49	31
Eye to gill slit	12		11	9.1	7.3	5.0	2.8
Soft dorsal ray count	34		37	36	35	35	34
Anal ray count	33		34	34	34	33	32
Pectoral ray count	12-12		12-12	12-12	12-12	11-11	12-12
Sex	Male		Male	Female	Male	Juvenile	Juvenile

Scales on body small, armed with slender acute spinules curving posteriorly at extremities, giving the skin a rather coarse feel; each mid-body scale with 1-5 spinules in a transverse row, increasing in number with increase in SL, scale outline not visible; 4 spines in 2 longitudinal rows on each side of caudal peduncle (rarely 1 or 3 spines in either row), strong and curving anteriorly in adult male, small and difficult to detect without magnification in juveniles and adult female; elongate spinules on scales anterior to caudal peduncle spines of adult male, forming a dense patch of small bristles, extremities curving forward.

Colour of holotype in alcohol (Fig. 11a) : head and body blackish brown to greenish grey with an indistinct pale longitudinal band extending along middle of side from caudal peduncle to below origin of soft dorsal fin; area anterior to spines on caudal peduncle pale yellowish grey, spines translucent with yellow bases; first dorsal spine and membrane blackish brown; soft dorsal and anal fin rays yellowish brown, those of pectoral dark brown, membranes hyaline; caudal fin blackish brown to black with several irregular greenish grey blotches anteriorly; lips blackish brown. Paratypes with similar coloration to above with the following exceptions: head and body entirely blackish brown or (after long preservation) uniform brown; anterior half of caudal fin greenish to brownish grey; juveniles overall greenish grey with lips, spinous dorsal fin membrane and caudal fin (or only posterior half) dusky.

Colour in life (based on underwater observations and a colour transparency provided by N. Coleman — see Fig. 11c) : head and body blackish brown to greenish brown with greenish yellow to orange area on caudal peduncle, extending as an irregular band along middle of side to below origin of soft dorsal fin; patch of bristles on caudal peduncle of adult male bright orange; dorsal and anal fin rays yellowish brown, those of pectoral blackish brown, membranes hyaline; caudal fin of adult male entirely black (fin rays may be somewhat brownish), while that of adult female black with yellow blotch on anterior half (Fig. 11c); when captured, adults generally acquire a pattern of small white to green irregular blotches on head and body, with other coloration more intensified. The following description refers to juveniles 50 to 80 mm SL : pale brownish green with small irregular pale blotches and spots on sides of body and head, tending to form irregular cross bars on dorsal surface of snout and forehead; 2-3 dark bars may be present on throat; all fin rays green, membranes hyaline except for those of caudal which are dusky posteriorly; lips brownish orange.

Comparisons

M. flavolineata is distinguished from other species of the genus by the black or black and yellow caudal fin and the greenish yellow to yellow mid-body band of the adult (Fig. 11c). In addition, all other members possess iridescent blue spots or lines on the head and body, a feature lacking in *M. flavolineata*. It appears to be closely related to *M. trachylepis* but this species possesses well defined scales whereas *M. flavolineata* has no obvious scale outlines.

Distribution

M. flavolineata occurs across the southern portion of Australia, from Newcastle, New South Wales to Fremantle, Western Australia, including northern Tasmania. It inhabits shallow offshore rocky reefs.

Remarks

This species is named *flavolineata* (Latin: meaning 'yellow-striped') with reference to the yellow band present on side in adult.

Meuschenia venusta new species

(Fig. 12; Table 1)

Holotype

WAM P.14881, 110 mm SL, female, collected from Shark Bay (approximately 25°30'S, 113°30'E), Western Australia, by trawl net, W. & W. Poole, June 1963.

Paratype

CSIRO C.2284, 125 mm SL, male, collected W of Garden Island (32°13'S, 115°39'E), Western Australia, by prawn trawl at 72 metres, M.V. *Lancelin*, May 1956.

Diagnosis

A species of *Meuschenia* with the following combination of characters : head relatively acute, upper profile of snout concave; first dorsal spine armed with small barbs, originating over posterior half of eye; scales on body small, each armed with 1 strong central spinule capped with a fleshy papilla, giving the skin a coarse feel; caudal peduncle unarmed; colour pattern consisting of 4-5 brown longitudinal body stripes on a white background, 2 of which continue anteriorly on head and posteriorly on upper and lower rays of caudal fin.

Description

Measurements and counts of the holotype and paratype are presented in Table 1.

Dorsal rays 34; anal rays 31 to 32; pectoral rays 12; caudal rays 12; vertebrae 7+13.

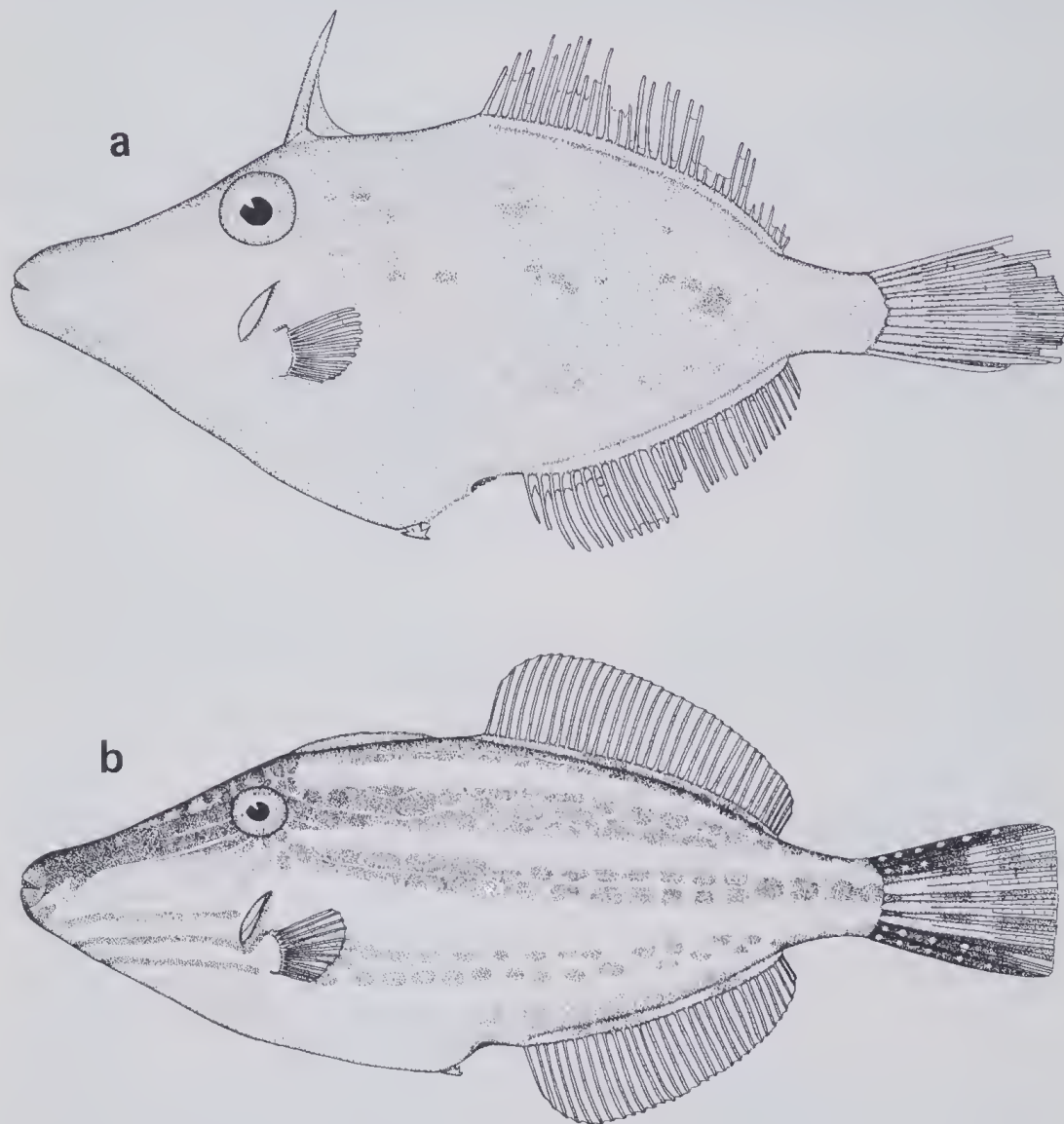


Fig. 12: *Meuschenia venusta* n.sp. : a, holotype, WAM P.14881, 110 mm SL, female (all fins except spinous dorsal damaged); b, male with life colour pattern (based on male paratype, CSIRO C.2284, 125 mm SL and two colour transparencies of live fish underwater).

Body compressed and rather elongate, somewhat deeper in female, width 2.2 in head length and depth 2.3-2.7 in SL; head acute, length 3.0-3.1 in SL; upper profile of snout concave, length 3.8 in SL; eye considerably large in holotype, diameter 3.4 in head length and 0.9 in interorbital width, smaller in paratype (4.1 and 1.1 respectively); gill slit centred below anterior half of eye, length 3.6-3.8 in head length; pelvis capable of moving vertically through an arc of 15° or less, producing a small ventral flap.

Mouth small, terminal, lips not obviously fleshy; dentition consists of 3 outer and 2 inner teeth on each side of upper jaw, extremities of inner teeth projecting between outer ones (extremity of uppermost inner tooth relatively prominent); 3 teeth on each side of lower jaw, posterior one small; all external teeth except posteriormost in each jaw with pointed extremities; pharyngeal teeth appear normal (based on radiographs), with 2 series of slender acute teeth on each side of upper pharyngeal region.

First dorsal spine moderately strong, length 1.8-1.9 in head length, originating over a point just anterior to posterior border of eye, received partly into a shallow groove in back when depressed (spinal groove of paratype somewhat deeper than that of holotype); dorsal spine armed with 4 series of small downward-directed barbs, 2 adjoining rows on anterior face only prominent on outer 1/3 of spine, lower barbs truncate and angled inwards, and 1 row on each postero-lateral edge directed rearwards (postero-lateral barbs rather obsolete on paratype); second dorsal spine small, hidden in skin at rear base of first spine; soft dorsal and anal fins damaged on both type specimens but appear to have a round outer margin, longest intact anal ray (5th-6th) 2.9-3.1 in head length; length of soft dorsal fin base 2.6-2.7 in SL, somewhat longer than base of anal fin (fin membrane not perforate at base); interdorsal space 1.5 in head length; base of pectoral fin below a point just anterior to posterior margin of eye; caudal fin short, 1.4 in head length, posterior margin damaged in both type specimens but apparently truncate (based on photographs of live fish — see below); all fin rays except those of caudal unbranched; pelvic bony structure moderate in size, 3.9-4.4 in eye diameter consisting of 2 pairs of incising scales fused to rear end of pelvis, each scale with prominent barbs.

Scales on body small, each with 1 strong central spinule capped with a fleshy papilla; extremities of spinules acute, curving abruptly rearwards, giving the skin a very coarse feel; caudal peduncle not armed with spines or bristles.

Colour of holotype in alcohol (Fig. 12a): ground colour brown with irregular darker blotches on side of body tending to form 3 longitudinal

stripes; head with 2 faint cross bars on throat, upper profile of snout dark brown, greenish between eyes; first dorsal spine pale turquoise, membrane brown with several paler spots; soft dorsal, anal and pectoral fins hyaline; caudal fin rays pale greenish grey, membranes enclosed within upper and lower 3 rays dark brown, remainder pale brownish grey. The paratype is similarly coloured except that thin pale lines are evident on head and body, with 3 rather more prominent ones originating between cross bars on throat, extending through and below pectoral fin base and tending to form a reticulate pattern surrounding dark brown blotches posterior to pectoral fin.

Colour in life (based on two colour transparencies by N. Coleman of live fish underwater — see Fig. 12b): ground colour white with 4-5 brown longitudinal bands on body consisting of close-packed spots of pupil size and larger, those in upper 3 bands in a somewhat reticulate pattern; 2 bands continue anteriorly on head, one through eye as a dark brown stripe to mouth, the other through pectoral fin as 3 parallel dark brown lines to upper portion of throat, lower 2 confluent with corresponding lines of opposite side; both bands also continue posteriorly on caudal fin; blue lines radiate from margin of eye (except antero-superior portion), those contained within head and body bands iridescent, generally fading on posterior half of body; greyish green area with dark brown spots (slightly smaller than pupil) on dorsal profile of head, from base of first dorsal spine to middle of snout; first dorsal spine brown, soft dorsal, anal and pectoral fins hyaline; several upper and lower rays of caudal fin blackish (continuations of body stripes), each with a row of white spots, remaining rays white, some with darker markings which tend to form 3 cross bars.

Comparisons

M. venusta is readily distinguished from other species of the genus by its colour pattern and scalation. It is the only species which has body stripes consisting of spots arranged in a somewhat reticulate pattern. Each body scale is armed with one strong central spinule capped by a fleshy papilla, whereas the typical adult condition in other *Meuschenia* is one to several transverse rows of small spines (small adults of *M. galii* may also have monospinulation, but the scales and spinules are minute). *Scobinichthys granulatus* and *Penicipelta vittiger* have a similar scalation to *M. venusta* but *S. granulatus* possesses an extremely mobile pelvis, capable of moving vertically through an arc of nearly 70° (see Fig. 2g) and the central pair of teeth in the upper jaw of *P. vittiger* are truncate (Fig. 5b), whereas the pelvis of *M. venusta* is capable of only limited vertical movement (15°) and its anterior teeth have pointed extremities.

Distribution

M. venusta is known only from the holotype and paratype collected in Western Australia from Shark Bay and off Perth respectively. In addition, it has been reported from Jervis Bay, New South Wales (N. Coleman, pers. comm.) where it was photographed underwater at 18-20 metres (two colour transparencies by N. Coleman, 10th-11th August 1974).

Remarks

This species is named *venusta* (Latin: meaning 'beautiful') with reference to its vivid coloration.

Rudarius excelsus new species

(Fig. 13; Table 6)

Holotype

AM IA.6764, 17 mm SL, male, trawled near Lindeman Island (20°27'S, 149°02'E), Queensland, G.P. Whitley, 1936.

Paratypes

WAM P.25603-001, 15 mm SL (stained and cleared), AM I.19169-002, 15-16 mm SL, both with same data as for holotype.

Diagnosis

A species of *Rudarius* with the following combination of characters : extremely small size at maturity (15 mm SL); prominently elevated dorsal and ventral profiles; extremely long bristles on caudal peduncle of male, projecting posteriorly to behind middle of caudal fin; low fin ray counts (D.22 to 24; A.20 to 22; P.10).

Description

Measurements and counts of the holotype and paratypes are presented in Table 6.

Dorsal rays 22 to 24; anal rays 20 to 22; pectoral rays 10; caudal rays 11 to 12 (holotype has 11 which is most likely due to malformation); vertebrae 7+13.

Body short and very deep, producing a postero-anterior compressed appearance, depth 1.1-1.2 in SL; body width 1.8-2.0 in head length; head

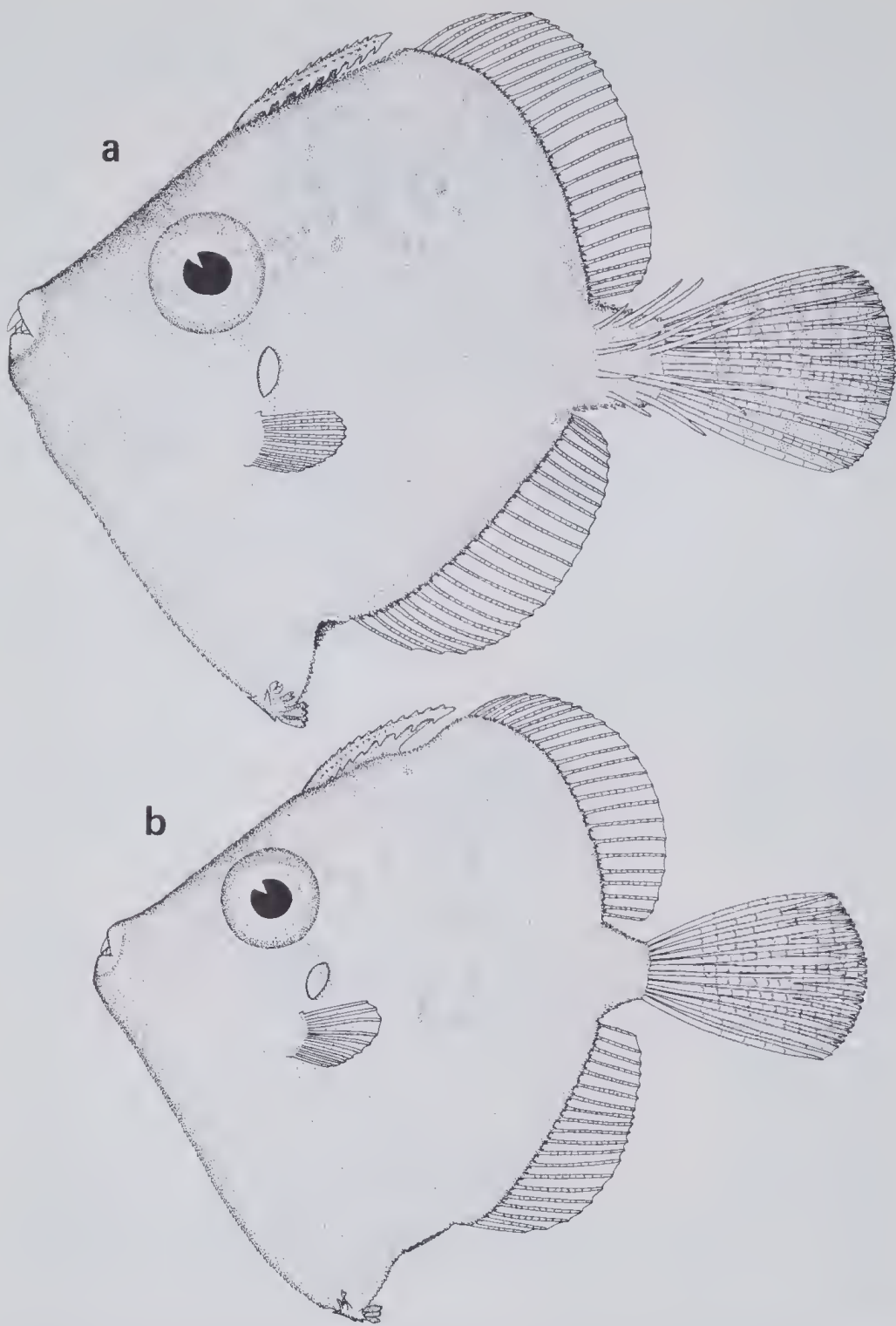


Fig. 13: *Rudarius excelsus* n.sp. : a, holotype, AM IA.6764, 17 mm SL, male; b, paratype, AM I.19169-002, 15 mm SL, female.

Table 6: Measurements in mm and fin ray counts of type specimens of *Rudarius excelsus*.

	Holotype AM	AM	Paratypes AM	WAM
	IA.6764	I.19169-002	I.19169-002	P.25603-001
Standard length	17	16	15	15
Head length	7.0	6.4	6.6	6.3
Body depth	16	13	14	13
Body width	3.8	3.3	3.3	3.2
Snout length	3.8	3.3	3.7	3.6
Eye diameter	3.4	3.0	2.8	2.7
Interorbital width	3.0	2.6	2.6	2.6
Gill slit length	1.2	0.8	1.0	1.0
1st dorsal spine length	5.4	4.4*	5.1	5.0
Longest soft dorsal ray	3.0	2.6	2.8	2.6
Longest anal ray	3.0	2.6	2.8	2.6
Longest pectoral ray	3.1	2.6	2.3	2.6
Caudal fin length	7.1	6.8	6.7	6.2
Soft dorsal fin base	8.8	6.9	7.1	7.5
Anal fin base	8.4	6.4	6.6	6.9
Interdorsal space	4.9	4.6	4.4	4.9
Caudal peduncle length	1.7	1.5	1.3	1.4
Caudal peduncle depth	2.3	1.7	1.6	1.6
Pelvic bony structure length	1.2	0.8	0.8	0.9
Snout to origin of dorsal spine	7.3	6.9	6.4	6.3
Lower jaw to rear of pelvic bony structure	12	13	12	11
Soft dorsal ray count	24	23	22	24
Anal ray count	22	21	20	22
Pectoral ray count	10-10	10-10	10-10	10-10
Sex	Male	Female	Female	Female

* measurement affected by damage

prominently elevated dorsally and ventrally, length 2.3-2.5 in SL; upper profile of snout straight to somewhat concave, length 4.1-4.8 in SL; eye relatively large, diameter 2.1-2.4 in head length, 0.9-1.0 in interorbital width; gill slit small, positioned above pectoral fin base and centred below posterior border of eye or behind, length 5.8-8.0 in head length; pelvis capable of moving vertically through an arc of 25° or less, producing a small but prominent ventral flap.

Mouth small, terminal, lips relatively fleshy; dentition consists of 3 outer and 2 inner teeth on each side of upper jaw, extremities of inner teeth projecting between the outer ones; 2 teeth on each side of lower jaw; extremities of all external teeth except posteriormost in upper jaw pointed; pharyngeal teeth not discernible on stained and cleared specimen.

First dorsal spine slender to moderately strong, slightly bent posteriorly, length 1.3-1.5 in head length, originating over posterior half of eye, no spinal groove in back for its reception when depressed; dorsal spine armed with 4 series of barbs, 2 rows of small but prominent upward-directed barbs on anterior face, numbering about 12-13 in each row, and 1 row of considerably larger downward-directed barbs on each postero-lateral edge, about 9-10 in number; second dorsal spine small, hidden in skin at rear base of first spine; soft dorsal and anal fins with somewhat round outer margins, longest soft dorsal ray (7th to 9th) 2.3-2.5 in head length, about equal to longest anal ray; bases of soft dorsal and anal fins curve prominently downwards and upwards respectively to caudal peduncle, length of soft dorsal base 1.9-2.3 in SL (bases of fin membranes not perforate); interdorsal space short, 1.3-1.5 in head length, profile rising prominently from spinous dorsal to soft dorsal origin; base of pectoral fin below or behind rear border of eye; caudal fin relatively long, 0.9-1.0 in head length; all fin rays except those of caudal generally unbranched; pelvic bony structure relatively prominent, length 2.8-3.7 in eye diameter, consisting of 2 pairs of incising scales fused to rear end of pelvis, armed with prominent barbs, and surrounded by several small dermal flaps.

Scales on body moderate in size, each with 1 small central acute spinule, curving posteriorly at extremity, giving the skin a velvety feel; male with about 12 greatly elongate bristles on caudal peduncle, projecting posteriorly to behind middle of caudal fin, extremities curving outwards (all bristles on right hand side broken off near bases); spinules on caudal peduncle of female small, slightly larger and spaced further apart than those on middle of side.

Colour of holotype in alcohol (Fig. 13a): head and body pale brown, lower half of head more whitish; scattered brown spots on upper portion of

body, about $\frac{1}{4}$ pupil in size; 2 white longitudinal lines on posterior portion of body, extending posteriorly a short way onto caudal peduncle; upper body line continued anteriorly, curving sharply downwards from about centre of side to gill slit and then rising to lower margin of eye; several white horizontal dashes below rear portion of soft dorsal fin base; dark brown ring surrounding posterior margin of lips; soft dorsal, anal and pectoral fins hyaline, caudal pale brown with darker indistinct cross bars, curving anteriorly. Paratypes similar to holotype except the white body lines are not prominent and no cross bars on caudal fin.

Comparisons

R. excelsus is apparently closely related to *R. ercodes* Jordan & Fowler from Japan. It differs mainly in the possession of greatly elongate bristles which project posteriorly from the caudal peduncle of the adult male, whereas *R. ercodes* has a patch of short bristles projecting more laterally than posteriorly. In addition, the dorsal and ventral profiles of *R. excelsus* are more elevated, and it possesses less soft dorsal and anal rays (D.22-24, A.20-22) than *R. ercodes* (D.25-27, A.24-27). *R. excelsus* is similar to *R. minutus* Tyler from Queensland and Borneo in several features including a small size at maturity and the possession of elongate bristles on the caudal peduncle. However, *R. minutus* has a relatively longer body, its pelvic bony structure does not appear to have scale divisions (2 pairs of incising scales in *R. excelsus*) and it possesses relatively large dermal flaps on the body (absent in *R. excelsus* although small ones surround pelvic bony structure).

Remarks

R. excelsus is known only from Lindeman Island, Queensland, the type locality. Its very small size has probably contributed to its rarity.

One female paratype, WAM P.25603-001, was found to be ripe when being prepared for staining and clearing. The eggs are relatively large, about 0.5 mm in diameter, and number approximately 120.

This species is named *excelsus* (Latin: meaning 'elevated') with reference to its prominently elevated dorsal and ventral profiles.

LIST OF THE KNOWN SPECIES OF MONACANTHID FISHES FROM AUSTRALIAN SEAS WITH THEIR PRINCIPAL SYNONYMS AND DISTRIBUTIONS

(Abbreviations: NSW, New South Wales; NT, Northern Territory; n.WA, northern Western Australia; Qld, Queensland; SA, South Australia; s.WA, southern Western Australia; Tas, Tasmania; Vic, Victoria.)

* New record for Australia

Acanthaluteres spilomelanurus (Quoy & Gaimard, 1824). NSW, Vic, Tas, SA, s.WA.

synonyms: *Aleuteres maculosus* Richardson, 1840

Aluterius paragaudatus Richardson, 1844-8

Monacanthus forsteri Castelnau, 1872

**Acreichthys radiatus* (Popta, 1900). Qld (AM IB.6156-7, 5 specimens, Swain Reefs, October 1962).

Acreichthys tomentosus (Linnaeus, 1758). Qld

Alutera monoceros (Linnaeus, 1758). Qld, NSW, Vic, WA, NT

synonym: *Aluterus anginosus* Hollard, 1855

Alutera scripta (Osbeck, 1765). Qld, NSW, WA, NT

synonyms: *Monacanthus macrurus* Macleay, 1881 (preoccupied)

Monacanthus maculicauda Ogilby, 1886 (new name for
M. macrurus Macleay, 1881)

Amanses scopas (Cuvier, 1829). Qld, WA

Anacanthus barbatus Gray, 1831. Qld, WA

Bigener brownii (Richardson, 1844-8). ?NSW, Vic, SA, s.WA.

synonyms: *Monacanthus lineoguttatus* Hollard, 1854

Monacanthus yagoi Castelnau, 1878

Monacanthus guttulatus Macleay, 1878

? *Monacanthus castelnaui* Macleay, 1881

Brachaluteres baueri (Richardson, 1844-8). Qld, NSW

Brachaluteres jacksonianus (Quoy & Gaimard, 1824). NSW, Vic, Tas, SA, s.WA

synonyms: *Aleuterius trossulus* Richardson, 1844-8

Monacanthus oculatus Günther, 1870

Monacanthus distortus Castelnau, 1873

Brachaluteres fidens Whitley, 1931

Brachaluteres wolfei Scott, 1969

Cantherhines dumerili (Hollard, 1854). Qld, NSW, n.WA

synonym: *Monacanthus howensis* Ogilby, 1889

- **Cantherhines fronticinctus* (Günther, 1866). n.WA (WAM P.25541-001, 2 specimens, 101-187 mm SL, North West Cape, 19 May 1976)
- Cantherhines pardalis* (Rüppell, 1835). Qld, NSW, n.WA
 synonyms: ?*Monacanthus homopterus* Cope, 1870
Monacanthus brunneus Castelnau, 1873
Pseudomonacanthus melanoides Ogilby, 1908
- Cantheschenia grandisquamis* n.sp. Qld
- Cantheschenia longipinnis* (Fraser-Brunner, 1941). NSW, WA
- Chaetoderma penicilligera* (Cuvier, 1817). Qld, NSW, WA, NT
 synonyms: *Monacanthus spinosissimus* Quoy & Gaimard, 1824
Chaetodermis maccullochi Waite, 1905
- Colurodontis paxmani* n.sp. Qld, WA
- Eubalichthys bucephalus* (Whitley, 1931). NSW, Vic, s.WA
 synonym: *Cantherhines brunneri* Norman, 1937
- Eubalichthys caeruleoguttatus* n.sp. n.WA
- Eubalichthys fuscusinus* n.sp. n.WA
- Eubalichthys gunnii* (Günther, 1870). Vic, Tas, SA, s.WA
 synonyms: ?*Monacanthus baudini* Castelnau, 1873
 ?*Monacanthus edelensis* Castelnau, 1875
Monacanthus melas Günther, 1876
- Eubalichthys mosaicus* (Ramsay & Ogilby, 1886). Qld, NSW, Vic, Tas, SA, WA
 synonym: *Weerutta ovalis* Scott, 1962
- Eubalichthys quadrispinis* n.sp. SA, n.WA
- **Laputa cingalensis* Fraser-Brunner, 1941. Qld (AM E.1963-4, 2 specimens, 134-148 mm SL, trawled off Bustard Head, 10 July 1910; AM I.11127, 151 mm SL, same data as above)
- Meuschenia australis* (Donovan, 1824). Vic, Tas
 synonyms: *Monacanthus rudis* Richardson, 1844
Monacanthus convexirostris Günther, 1870
- Meuschenia flavolineata* n.sp. NSW, Vic, Tas, SA, s.WA
- Meuschenia freycineti* (Quoy & Gaimard, 1824). NSW, Vic, Tas, SA, s.WA
 synonyms: *Monacanthus multiradiatus* Günther, 1870
Monacanthus prasinus Castelnau, 1872
 ?*Monacanthus lesueurii* Castelnau, 1873
Meuschenia skottowei Whitley, 1934
- Meuschenia galii* (Waite, 1905). Vic, SA, s.WA
- Meuschenia hippocrepsis* (Quoy & Gaimard, 1824). Vic, Tas, SA, s.WA
 synonym: *Aleuterius variabilis* Richardson, 1844-8

- Meuschenia trachylepis* (Günther, 1870). Qld, NSW
synonym: ?*Balistes lemniscatus* Lacépède, 1804
- Meuschenia venusta* n.sp. NSW, WA
- Monacanthus chinensis* (Osbeck, 1765). Qld, NSW, WA, NT
synonyms: *Balistes geographicus* Cuvier, 1817
Balistes mylii Bory de Saint Vincent, 1822
Monacanthus megalouris Richardson, 1843
Monacanthus macrolepis Fraser-Brunner, 1941
- Nelusetta ayraudi* (Quoy & Gaimard, 1824). Qld, NSW, Vic, SA, WA
synonyms: *Aleuteres velutinus* Jenyns, 1842
Monacanthus vittatus Richardson, 1844-8
Monacanthus platifrons Hollard, 1854
Monacanthus frauenfeldii Kner, 1867
- Oxymonacanthus longirostris* (Bloch & Schneider, 1801). Qld, n.WA, NT
- Paraluteres prionurus* (Bleeker, 1851). Qld, NSW
- Paramonacanthus filicauda* (Günther, 1880). Qld, NSW, Tas, WA, NT
synonym: *Monacanthus filicauda notonectianus* Whitley, 1931
- Paramonacanthus oblongus* (Temminck & Schlegel, 1850). Qld, NSW, n.WA, NT
synonyms: *Paramonacanthus oblongus otisensis* Whitley, 1931
Paramonacanthus whitleyi Fraser-Brunner, 1941
- Paramonacanthus sulcatus* (Hollard, 1854). Qld
synonym: *Arotrolepis barbarae* Fraser-Brunner, 1941
- Parika scaber* (Forster, 1801). NSW, Vic, SA, s.WA
synonym: *Monocanthus setosus* Waite, 1899
- Penicipelta vittiger* (Castelnau, 1873). NSW, Vic, Tas, SA, s.WA
synonym: *Monacanthus guntheri* Macleay, 1881
- Pervagor melanocephalus* (Bleeker, 1853). Qld, NSW, n.WA
- Pervagor nitens* (Hollard, 1854). Qld, NSW
synonym: *Monacanthus alternans* Ogilby, 1899
- Pseudalutarius nasicornis* (Temminck & Schlegel, 1850). Qld
- Pseudomonacanthus elongatus* Fraser-Brunner, 1940. Qld, NT
- Pseudomonacanthus macrurus* (Bleeker, 1857). ?Qld
- Pseudomonacanthus peroni* (Hollard, 1854). Qld, n.WA
synonym: *Cantherines maynardi* Ogilby, 1916
- Rudarius excelsus* n.sp. Qld
- Rudarius minutus* Tyler, 1970. Qld

- Scobinichthys granulatus* (Shaw, 1790). NSW, Vic, Tas, SA, WA
 synonyms: *Monacanthus perulifer* Castelnau, 1872
Monacanthus margaritifer Castelnau, 1873
Monacanthus brunneus Castelnau, 1873 (preoccupied)
Monacanthus obscurus Castelnau, 1875 (new name for
M. brunneus Castelnau, 1873)
Monacanthus damelii Günther, 1876
Monacanthus saintjoanni Castelnau, 1878
Tantalisor pauciradiatus Whitley, 1947
- **Stephanolepis auratus* (Castelnau, 1861). n.WA (WAM P.25579-006, 6 specimens, 115-210 mm SL, off Koks Island, July 1976)
- Thamnaconus analis* (Waite, 1904). NSW
- Thamnaconus degeni* (Regan, 1903). NSW, Vic, Tas
- Thamnaconus hypargyreus* (Cope, 1873). Qld
- **Thamnaconus modestoides* (Barnard, 1927). n.WA (WAM P.22099, 241 mm SL, off Cape Cuvier, 29 July 1972; WAM P.22101-2, 2 specimens, 133-189 mm SL, same data as above)

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